Ref 71F

Unasylva

Volume III, Number 5 • September-October 1949

19 OCT. 1949

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Unasylva

A Review of Forestry and Forest Products

September-October 1949 Vol. III, No. 5

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Cover photograph: Raw materials for pulp mills. Stockpiles of pulpwood logs being sprayed with water to minimize fire hazard. Pulp and pulp products account for nearly two thirds of the value of all exports of forest products.

—Photograph by courtesy of Canadian National Film Board.

Wood Pulp

The simple fact about wood pulp is that it is not only an important industrial commodity; it is a vital raw material on which men and women throughout the world are becoming increasingly dependent.

This was recognized by the Preparatory Conference on World Pulp Problems, held at Montreal, 25 April to 4 May 1949. Here, for the first time, competent experts, businessmen and government officials met to arrive at an agreed view about the world pulp situation and to consider steps that might be recommended for national and international action.

It was not the purpose of the Montreal Conference to prepare a commodity agreement on pulp. As Mr. Norris E. Dodd, Director-General of FAO, said, "We do not believe that there is need for an international pulp agreement. You are in the happy position of a gradually expanding industry which can derive considerable benefit from international consultation and which needs some regional and world-wide planning, but beyond that I believe the maximum freedom should be left to the initiative of individual industries and countries."

The conclusions of the Conference on the world outlook are given in this issue. Its recommendations, and a great deal of information on the situation in individual countries and regions, appear in *Report of the Preparatory Conference on World Pulp Problems.*

Wood pulp, as a primary forest product, is assigned to FAO under its charter, and FAO cannot ignore the world's needs for the products made from wood pulp. The Conference was a step towards realization of the hope, expressed by Mr. Dodd, in his opening speech, "that in due course the nations working together through FAO will be able to provide the world's people with as much paper, textiles, and other pulp products as they require to achieve modern standards of health and education, and, in general, to make progress on the path of civilization."

Green Gold

This is the title of a new documentary film about forests and timber, shortly to be released in theaters throughout the world. Produced for the United Nations by Svensk Filmindustri, the film emphasizes that the nations of the world must work together to ensure that their forests are perpetuated and used for the good of all. This article serves as an introduction to the film for the general public. It also outlines the steps taken by FAO's 58 member countries in their efforts to promote the better development of their forest resources through FAO.*

On a summer's day in a peaceful valley in Sweden, the film *Green Gold* discovers a farmer plowing in his fields, while in the village nearby the daily life goes on. A carpenter repairs a house, a child plays on a swing, and a housewife cooks the family meal. None of these daily activities would be possible without wood. So, although all summer long the life of the village is focused on the cultivation of the fields, as winter approaches the farmer and his neighbors take up their second occupation of forestry. While the fields lie under the heavy snows, they take their horses and sleds into the surrounding forests. Now the village life revolves around the forests which echo with the sound of axes and saws, and the crash of falling trees. The horse-drawn timber logs are carried down snow roads to the lakes and the rivers to form the second link in the chain between the forest, farm, and home.

Another link in this chain is forged with the coming of spring. When the ice melts, the logs come jostling down the rivers, moving slower and slower as they near the sea. In the coastal waters, men and women sort the logs, guiding them to the sawmill and the pulp factory. Now the chain extends, the sawmill makes lumber for houses, and from the pulp factory comes paper, the most commonly used article of daily life. Some of the logs take a bypath and become telegraph poles and plywood, or are made into almost anything from furniture to airplanes.

Many of these wood products are loaded into ships and traded in the world's centers of finance and industry. Millions of people will use these articles, and millions more will make a living directly or indirectly from the world's forests; and, when the forester is paid for his "green gold" the last link in the chain is closed.

"Yes, timber is green gold," the film says, "but the forest is not a gold mine to be ruthlessly exploited." It may take 70 years to grow a tree, but only 70 seconds to cut it down; and, when the forests are destroyed, nature strikes back. Disaster may begin with a storm raging over farms and fields unprotected by forests. The water splashing unhindered over the land washes away the rich topsoil, and the angry rivers swell and flood their banks. In a very short time, once prosperous farms disappear, and their owners face ruin.

The forests of the world must be preserved if only because they are the guardians of soil and water. They protect the land against soil erosion, create great water reserves, influence the climate, and sometimes even supply the farmer with the very soil on which he grows his crops. The tie between the forests and the farms is made stronger, because in most countries the farmer depends on the forest lands for his house, his barns, his fuel, and his fences, and he is the man who must do most to preserve them.

In Sweden and other parts of Europe, the farmer-forester may manage his woodlots properly, but he will still take his forest wealth for granted. He knows that there is plenty of wood for the daily needs of his family, and that he will be able to sell much more besides. Yet in India, China, and many other countries in Asia, the foresters know that their denuded forests cannot provide enough wood for even the barest needs of fuel and housing for everyone. In the Near East, there is no longer any great forest wealth; a few groves are all that remains of the cedars of Lebanon, famous in Biblical times, and the once fertile agricultural lands around them are now an arid desert.

But in other continents, notably Latin America, great virgin timber forests exist, unexploited and often unmapped. In addition to the tropical forests made up of an infinite variety of species, there are some nearly pure stands of commercial timber. For many technical and economic reasons these forests have never been tapped, but none of these reasons provides any justification for allowing this situation to last. Through the use of modern techniques it is possible within the next generation to make Latin America one of the large suppliers of forest products to a prosperous world.

Of the four thousand million hectares of forest soils in the world, only one-third has been taken into use. The yield from these exploited forests is about one ton of wood products to every hectare. Yet with proper

*Distribution is available through the United Nations Department of Public Information, Lake Success, New York, U.S.A. Length 20 min., B and W, size 16 or 35 mm. Narration English, French, Swedish.

The first link in the chain between the forest, farm, and home. Farm woodlands in a peaceful valley in Sweden.

management, forests can be made to yield at least two tons of wood products from every hectare. This would mean doubling the amount of wood products available to the people of all continents.

There is no doubt that there is a great pent-up demand for wood products. According to the statisticians, one-third of all humanity, living in Europe, North America, and Russia, use 80 percent of all timber and 90 percent of all pulp produced in the world. Yet, 15 hundred million people living in other regions of the world need wood just as much. Besides this potential demand, the recent discoveries made by wood chemists and technologists of the manifold new uses of wood products have already created a further demand for wood, beyond the basic needs for fuel and housing.

In times of world economic crisis when markets seem to be saturated with wood, many foresters in the great timber producing countries of Europe and North America might well believe that there is already too much wood in the world. But if all the nations of the world worked together to solve the difficult but not impossible problem of increasing the purchasing power of underdeveloped countries, then millions more people could afford to buy these wood products, and those who produce the wood would be sure of getting a fair price for it. With a properly charted course for forest development and with the aid of science, billions of tons of additional goods, from nutritious protein yeasts and plastics to paper and houses, could be extracted from the forests each year to usher in a new era in the use of wood.

This is the theme of the new United Nations film *Green Gold*. It is also the basic idea behind the formation of the Division of Forestry and Forest Products of the Food and Agriculture Organization of the United Nations. FAO is charged by its member countries with the job of increasing the yields of their farms, forests, and fisheries, and the Division of Forestry and Forest Products has the specific job of increasing the world's wood supplies. It seeks to carry out this job by encouraging the member countries to reduce waste of wood in logging, manufacture, and use, to improve domestic and international distribution, to increase the yields from existing forests by scientific methods, and to create new forests. The very name of the Division gives a clue to its general policy. It is recognized that there can be no dividing line between the forest and its products, because the forest

The second link in the chain. In the winter, horses and sleds bring down logs to frozen lakes and rivers.

crop is an industrial crop that once cut is transformed into an infinite variety of products. It would be as illogical for FAO to consider only the forests themselves as to consider the planting of grain and animal husbandry without giving thought to the nutrition needs of a hungry world.

During its three years of operations, the Division has taken several important steps forward in this great venture. It has started on the immense job of fact-finding, for there is at present no source which gives even a close evaluation of all the world's forest resources. It has taken over many of the multifarious international forestry bodies that competed with each other before the war. It is mapping the course to be pursued by the world's laboratories in their attempts to solve the many difficulties in the way of transforming wood into useful products. Backed by 58 member countries, it will continue to give such help until yesterday's transient sawmills are transformed into tomorrow's stable and large-scale forest industries.

The film *Green Gold* gives only a hint of the ramifications of this work, but it does provide a glimpse of the Marianske-Lazne Conference, held in Czechoslovakia in 1947, which was the forerunner of other conferences arranged by FAO, where nations came together to fit their national forestry plans into a broad regional pattern. Europe was selected as the first area for FAO action, because of the tremendous shortage of timber which followed in the wake of the last war. The work in Europe was carried out in three phases which have since been adopted as the pattern for action in all the other regions of the world.

In the first phase, FAO experts went to Europe to review the situation at first hand. They found that the forests of Europe had been drained of one-sixth of their trees since 1937, while countries were still cutting more trees than they could well afford to rebuild factories and buttress mine walls so that needed coal could be produced. They found that timber extraction equipment was worn out, and the horses formerly used in transporting the logs had disappeared and not been replaced. When men were available, they could not always go into the mountain forests to cut wood for the spring thaw because they lacked good food, warm clothing, and shoes that would stand up to their heavy work. Meanwhile, housing waited for lumber. According to a recent survey made in 15 European countries, over a million and a half houses are needed each year for the next five years. In the face of this unprecedented demand, these same countries are able to build only about half a million houses a year. Real timber needs, then, were enormous, but because most countries did not have enough foreign currencies to buy timber from abroad, they had to lower their demands to under half of what they really needed. In general, international trade and normal channels of distribution had been completely disrupted by the war, and there was no international machinery capable of getting it moving again. An acute timber crisis seemed inevitable.

FAO put into operation the second phase of its program and arranged for 27 European nations to get together at the International Timber Conference at Marianske-Lazne. Here, the experts got busy with their pencils and figured that in 1948 Europe would need about three million more standards of lumber than it could possibly obtain under existing conditions. A bold step had to be taken. The nations agreed to cut 10 percent more trees than they had planned and to use lumber only where it was absolutely necessary. This was largely done and it gave Europe about two and a half million extra standards of badly needed timber that year.

However, this drastic solution meant a further drain on the already depleted forests of Europe. This problem was recognized at Marianske-Lazne. FAO therefore decided to put into operation the third phase of the program. This was done by setting up a European Forestry and Forest Products Commission, which has the responsibility of promoting all aspects of good forest management, and encouraging European countries to look again at their national forest plans in the light of future world conditions. This office recently reported that all the large-scale regeneration and replanting of forests recommended at Marianske-Lazne to offset the temporary drastic increase in cuttings are now being carried out.

While these three phases of the FAO program were being put into practice, a new international agency appeared on the scene—the United Nations Economic

Commission for Europe. This agency is charged with the general responsibility for promoting the economic reconstruction and development of the continent. Together, FAO and ECE decided to set up a Timber Committee within the framework of ECE, to continue work on the emergency problems of the European timber supply. Towards the end of last year, the gap between Europe's immediate timber needs and supplies, which two years ago had seemed one of the most alarming aspects of European reconstruction, was substantially closed. Now the task is to obtain more timber for the real needs of the European communities.

The Committee has a plan designed to increase the exports of European softwoods by 120 million dollars worth of timber during the next two years. The plan calls for obtaining this timber by placing at the disposal of the producing countries about 16 million dollars worth of forestry equipment, ranging from leather harnesses to complete sawmills. After a survey of the supplies available in Europe and North America, it was discovered that only about half of this equipment would have to be purchased with dollars, because much of what was needed was manufactured in Europe and could be obtained in exchange for timber. The International Bank for Reconstruction and Development also agreed in principle to extend credits to interested countries for the purchase of the equipment which was needed from the United States of America. Negotiations for these timber loans are now in an advanced stage, but final trade and finance agreements have as yet only been signed with Finland. In return for this help, European wood producers pledged themselves to export the extra timber supplies made possible by the use of this new equipment. With the signing of other agreements between the various countries concerned and the Bank, more lumber will be made available, and Europe will have taken a great step forward in the modernization of its forest industries.

In Latin America, FAO followed the same program of action. In the first phase, members of FAO's staff travelled all over the continent sizing up the timber situation. They already knew that the virgin forests of Latin America cover over 850 million hectares of land, and are made up of a great variety of species. They also knew that despite this untold wealth, Latin America today imports perhaps twice as much wood as it exports. They wanted to find out how these timber lands could be developed. Obviously, it would take a common program of action subscribed to by all Latin-American countries before the gigantic task of exploiting new wood species and building up forest industries could really get under way. These men reported back to FAO headquarters their conversations with top forestry officials of Latin America on de-

The chain extends. Sorting logs for the sawmills and the pulp factory.

velopment possibilities, and it was decided to put the second phase of the program into operation.

In May 1948, 18 countries attended the Latin-American Conference on Forestry and Forest Products at Teresopolis, Brazil. The nations at this Conference represented four major interests in Latin-American forestry development. Within the Latin-American group were countries which have tremendous reserves of forest wealth. The second group consisted of the highly industrialized nations from which the machinery and equipment for exploitation of these forests would have to come. The European nations present at the Conference formed a third group, which was interested in future export possibilities. The fourth group was made up of the European and North American forestry experts who had previous first-hand experience of forest conditions in Latin-American countries, and thus could help these countries define their problems.

The outstanding achievement of the Teresopolis Conference was the unanimous agreement of all interested governments of Latin America to press forward with the establishment of concrete action programs of development. Aided by FAO, the countries started listing their immediate equipment and credit requirements. They made preparations for complete inventories of their forest resources, the extension of national forest services, and the setting up of research and training facilities on an international basis for all Latin-American countries. The nature of the obstacles to be overcome is well illustrated by the problem of training sufficient foresters. Latin America needs over 1,000 professional and over 2,000 semi-professional trained foresters to assure the proper management of its magnificent forest resources. Yet, today there are only some 300 professional and 450 semiprofessional foresters at work, and many of these need more intensive training.

To keep in intimate touch with the national forestry plans, FAO set up a permanent Forestry and Forest Products Office for Latin America in Rio de Janeiro early in 1949. With the establishment of a Latin-American Forestry and Forest Products Commission, which has already held its first session, the third phase of FAO's preparatory action was completed for this region. The basic job of this Commission is to induce all Latin-American countries to adopt specific development programs for their forests and forest industries within a regional framework.

At its first meeting this Commission adopted an initial report on the amount of capital and equipment needed for the development of the continental forests. Further investigation had shown up another aspect of the question, namely, that lack of equipment is not the real obstacle to development. Before equipment can be used there must be an industry capable of using it, and at present such an industry can be found only in a few instances, and on a very small scale. Therefore, the emphasis of this report was centered on the needs for capital, industrial leadership, and markets for the systematic development of modern forest industries in the various countries.

It can be seen that the problem of making full use of these tropical forests has many aspects, and the task is certainly not an easy one. Research and tests must take place before forest industries can be established in the Amazon Valley and other tropical forest areas of this continent. It is therefore proposed to set up as soon as possible one or two so-called "forestry combinates" in tropical areas. Such a combinate is based on principles of full use and systematic management of a fairly large forest area. This is achieved by setting up a variety of mutually complementary industries such as a pulp mill, a sawmill, a plywood mill, and possibly plants capable of manufacturing a number of chemical products. In this way the waste from one operation becomes raw material for the others, and yields which in isolated industries are as low as 20 percent of the volume of wood cut, can be raised to 60 or 80 percent.

If this approach is successful, it will supply the key to open up one of the world's largest storehouses of renewable wealth, capable of supplying almost any kind of product, both for the home needs of the people of Latin America and for export to other continents.

Unlike the American and European regions, the Far East has relatively small forest resources. As a result, the very dense populations in this region have to get along with a small fraction of the wood available to the people of Europe and the two Americas. The need for wood is so large that it would be futile to expect to fulfill it in a short time either from the Far Eastern forests or from heavy contributions from other continents. This shortage of wood is very largely due to centuries of forest destruction and poor management, brought about in turn by the tremendous pressure on the land of the ever-growing population. So great has been the need for food in many countries that cultivation of crops has been attempted on hillsides on which forests should never have been cut. In other countries, forests have been completely cut down and the areas they once occupied are now barren and infertile. The resulting widespread erosion of the farm lands has today reached alarming proportions and threatens the very existence of millions of people. There is no real way out of this vicious circle except by helping governments to plan and carry out large-scale replantings of the treeless expanses. Meanwhile, through the sound development of the few remaining unexploited forests, the increase of timber exports from the more heavily forested areas to other parts of the region, and the better use of existing supplies, much can be done to relieve the two most urgent needs, namely, fuelwood and cheap lumber for housing and other construction work.

In this region FAO has completed the first two phases of its forestry development program. After the preliminary contacts had been made with the leading forestry officials of the Far East, the Forestry and Timber Utilization Conference was called in Mysore, India, in 1949. This was the first international meeting ever held on the forestry problems of Asia and the Pacific, and the response of the 10 countries attending this meeting was enthusiastic.

On the immediate problem of getting more fuelwood and charcoal to the villages, the delegates at this Conference agreed on a variety of measures for governments to translate into action. Much more timber is

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Photographs in this article by courtesy of:
Canadian National Film Board (p. 171)
U. N. Department of Public Information (p. 167)
Royal Norwegian Information Services (p. 168)
Swedish Tourist Traffic Association (p. 169)

available than is generally recognized, but it must be moved from areas of plenty to areas of scarcity and it must be used economically. Modern charcoal kilns and modern sawmills would reduce waste in the use of wood and thus stretch available supplies.

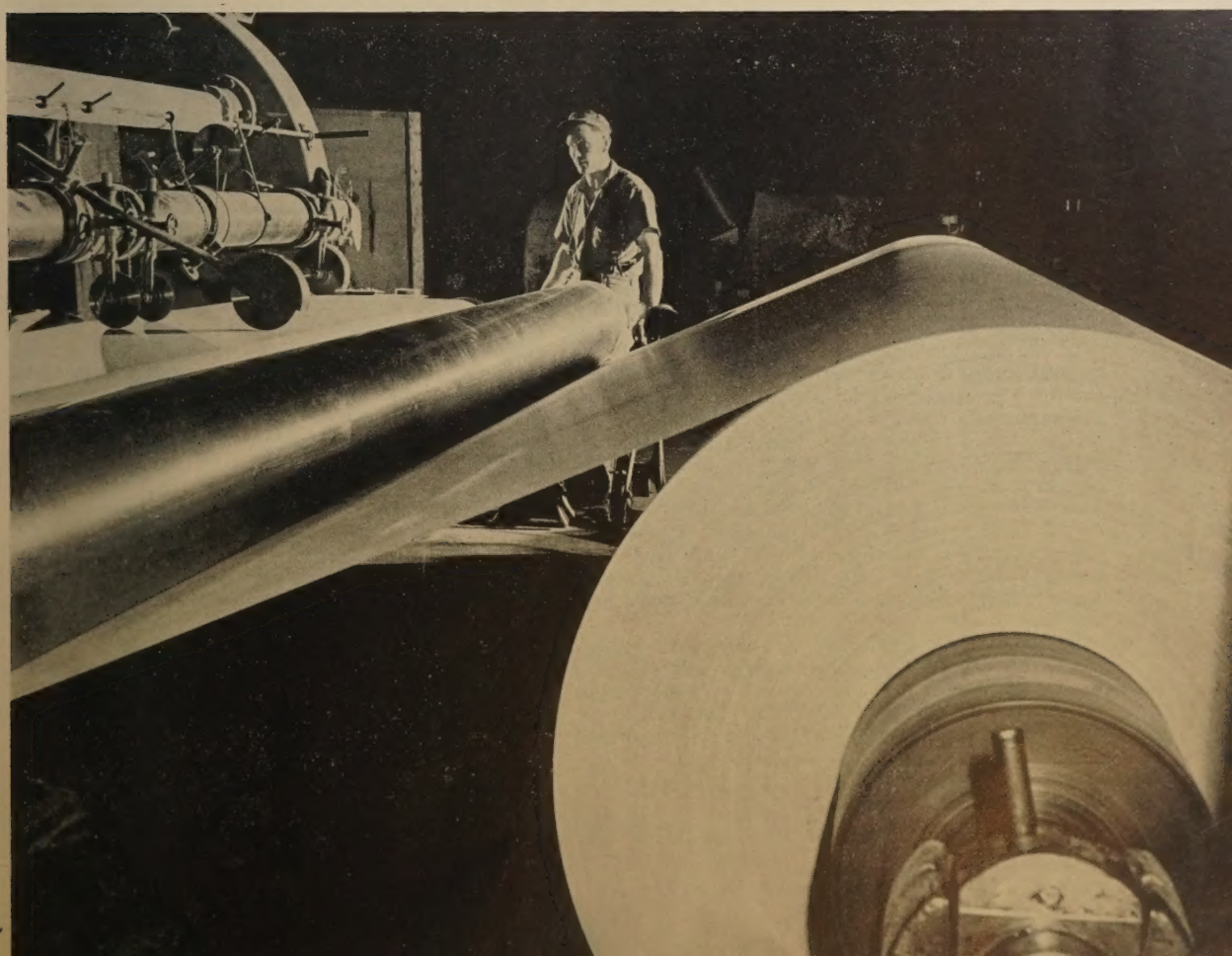
On the outstanding problem of soil erosion control, the Conference asked each government of the region to set up a central authority to plan and carry out good land use and soil conservation practices. It proposed that laws be passed in each country enabling the government to act whenever these practices are neglected, either on state-owned or private lands. It also called for bold schemes for protecting and replanting trees at the headwaters of the great rivers of this region, as well as for large-scale reforestation projects. All these measures will be promoted actively by the recently established FAO Far Eastern Forestry and Forest Products Working Group.

The third phase of the program is scheduled for 1950, with the setting up of the Asia and Pacific Forestry and Forest Products Commission which was requested at the Mysore Conference.

FAO has also begun work in the other forest regions of the world. In the Near East, where forest restoration is one of the greatest needs, the first phase of the development program is now being carried out by member countries. Exploratory travel in Africa has also been started and information is being exchanged between FAO and the forestry officials of the countries making up this region. In the North American region, comprising the United States of America, Canada, and Alaska, excellent forest services already exist for the proper management of the tremendous resources, and the big industrial companies are increasingly practicing good forestry. The remaining great forest region of the world is in the U.S.S.R. This country is not yet a member of FAO but the Government of the Soviet Union is pursuing measures which hold great promise for a sound development of the country's immense forests.

So long as want exists in the world, the immediate task of FAO is to increase the present supplies of food and wood and get them to where they are most wanted. But the task for the future is to bring about a wiser use of land so that there shall emerge a world better fed and better sheltered. For both of these tasks we must call upon the forest, for beyond its role as the protector of crops and conserver of water, the forest is the factory that produces earth's foremost renewable resource—wood.

Slitting newsprint into sizes required by news presses. The money which you pay for your morning newspaper will in part filter back to the forester, thus completing the chain.



Commodity Reports

Wood Pulp

Conclusions of the Montreal Conference

NOTE: *These conclusions were drafted in the spring of this year. Subsequent developments and the economic adjustment in the United States have accentuated certain features of the world situation. In Scandinavia particularly, a virtual cessation of United States pulp imports is having a most serious effect on dollar balances. Consumption in the United States is so large in relation to the amount of European pulp imports that even a mild decline in American consumption can stop marginal imports, thus throwing the economies of the exporting countries seriously off balance. A greater reliance on alternate markets would be safer although at present this would not help the quest for dollars.*

IN one sense, world needs for the products of pulp—newsprint, other printing and writing papers, wrappings, packaging material, and textile fibers—are far greater than existing supplies. This was the tenor of the message from UNESCO, with which the Conference agreed in principle.* However, physical limitations as well as the economic and financial problems connected with the acquisition of desirable supplies seem to stand in the way of meeting consumer needs as disclosed by UNESCO. Accordingly, the Conference had to restrict its deliberations to the *present and future effective demand of the pulp-using industries.*

The Conference estimates given in Table 1 show approximate equilibrium between world production and requirements for 1948 to 1955. If these figures are confirmed by subsequent developments, there should be no major wood pulp surplus or deficit during the period under review.

The war has brought about a major change in the distribution of pulp production and pulp consumption as between different regions of the world. North America, which in 1937 produced 46 percent and consumed 51 percent of the world output (excluding the U.S.S.R.) now produces 68 percent and consumes 70 percent. The production and consumption of Europe, on the other hand, have fallen from 49 percent and 42 percent respectively in 1937, to 29 percent and 25 percent in 1948. The relative and absolute importance of consumption in Asia and the Far East have been reduced, largely because of the changed situation of Japan. In Latin America and in Oceania large percentage increases in output have occurred, but the tonnages in both regions are small in terms of world production.

Although 1948 production at nearly 28 million metric tons was the highest on record, it was estimated that there was in existence unused pulp producing capacity to the extent of 4.3 million tons in Europe and of more than one million tons in other parts of the world, mainly in Japan. At the same time a large amount of new capacity was being built or planned.

The increases for consumption and production of wood pulp and pulp products forecast for 1955 are subject to limitations which, particularly in Europe and Japan, may place grave difficulties in the way of their fulfilment. On the continent of Europe, but with less application to the northern countries, forests have been heavily overcut during the war and postwar years, and these accelerated rates of cutting cannot be sustained indefinitely without disastrous results. Full use of the pulp productive capacity which already exists would require an increase of about 60 percent in Europe in the rate of cuttings achieved in 1947 if full reliance were to be placed on the forests of the region. This appears to be improbable because of the high level of demands for other and competitive forest products, such as saw timber and pitprops.

The situation is made more acute by the cessation of pulpwood exports from the U.S.S.R. Current estimates for European pulp production in 1955 would require net imports of pulpwood in excess of 3 million cubic meters. This figure is to be compared to a total European pulpwood cut expected to range from 40 to 50 million cubic meters around 1955. Yet this deficiency raises a difficult problem since it affects primarily the countries of western Europe which, in view of the present state of their forest resources, have to rely on large pulpwood imports.

The Japanese Government desires to increase woodpulp production substantially in spite of the domestic forests being overcut twice their annual growth. This Japanese production plan does not have the approval of the occupation forces. Prospects for large imports of pulpwood are not good because of the lack of adequate funds by the Japanese.

A factor affecting paper supplies is the increased manufacture of dissolving grades of pulp, mainly for the production of textile fibers. Although this diversion affects only a small proportion of the total production of chemical pulp at present, it tends to reduce the amounts available for the production of paper and paperboard whenever it occurs without the corre-

*See *Report of the Preparatory Conference on World Pulp Problems,* Montreal, June 1949.

sponding expansion of pulp producing capacity, as is true in some of the older pulp producing areas.

Short-Term Situation

The figures appearing in Table 1 with regard to 1949 and 1950 are on the whole more reliable estimates than those shown for 1955. Yet even in interpreting these figures it should be remembered that they constitute maximum estimates which are both possible and desirable, but which might be substantially modified in the light of general economic conditions. Moreover, the fulfilment of these estimates must come in most countries from the action of individual producers and pulp consuming industries over which the governments represented at this Conference exercise no direct control.

World pulp production (excluding the U.S.S.R.) was almost four million tons higher in 1948 than in 1937, the best prewar year. Statistics assembled by the Conference indicated that this output was slightly in excess of current consumption. Although the apparent world surplus was less than three percent of production and may be due to statistical inaccuracies, it tends to explain the recent decline in prices, accumulation of stocks, and the difficulties encountered by producers in disposing of their pulp.

The estimates for 1949 and 1950 indicate a rapid restoration of equilibrium. World pulp requirements for 1949 are expected to exceed last year's consumption by 1.2 million tons, while world production will increase by about 1 million tons. For 1950 a further rise in requirements by 2.5 million tons is anticipated which would exceed production by 100,000 tons. If these forecasts are confirmed by subsequent events, there might be a slight deficit by the end of 1950.

These world trends may be accompanied by certain shifts in the geographical distribution of wood pulp production and consumption. Despite capacity increases, North America's output in 1949 is expected, for economic reasons, to remain below the previous year; this reduction would be offset by a projected increase in European production of 900,000 tons. In 1950 European production is expected to expand by another 600,000 tons and North American production by 1.3 million tons.

It is expected that European requirements will show a very much quicker expansion than European production, with the result that Europe's net surplus available for export from current production of wood pulp would decline from 1 million tons in 1948 to 550 thousand tons in 1949 to some 200,000 tons in 1950. To the extent that currency considerations compel European producers to give priority to whatever they can sell for dollars, the supplies of wood pulp available to Europe from European production might fall below effective requirements unless the production in northern Europe is correspondingly increased. If, on the other hand, European requirements were fully met, this might curtail substantially Europe's possibilities of securing dollars and other non-European currencies through pulp exports.

In North America also, market pulp requirements are likely to continue on a somewhat higher level than production. It is possible, however, that some of the resulting net import requirements may be met from accumulated stocks; it should further be remembered that North American requirements are calculated on the assumption of full employment and other economic conditions which may not occur.

Table 1.—World Pulp Balance[1]

Region	1937		1948		1949		1950		1955	
	Consumption	Production	Consumption	Production	Requirements[2]	Production	Requirements[2]	Production	Requirements[2]	Production
	(1,000 metric tons)									
Europe	9,900	11,590	7,000	8,050	8,350	8,900	9,400	9,600	11,800	11,100
U.S.S.R. (Exports)	.	[3]145		40	.....	50	.....	75	.....	200
Near East and N. Africa	15	5	15	10	20	15	20	15	30	30
North America	12,030	10,950	19,255	19,010	18,930	[4]18,995	20,290	[4]20,310	23,705	[4]23,915
Latin America	245	25	470	190	550	295	580	315	685	440
Africa	.	.	15	15	15	15	15	15	40	30
Asia	1,525	1,180	520	505	630	600	715	665	925	880
Oceania	50		200	160	195	150	245	175	450	345
World	23,765	23,895	27,475	27,980	28,690	29,020	31,265	31,170	37,635	36,940

Region	Apparent surplus (+) or deficit (—)				
	1937	1948	1949	1950	1955
	(1,000 metric tons)				
Europe	+1,690	+1,050	+550	+200	—700
U.S.S.R.	+ 145	+ 40	+ 50	+ 75	+200
Near East and N. Africa	— 10	— 5	— 5	— 5	.....
North America	—1,080	— 245	[5]+ 65	[5]+ 20	[5]+210
Latin America	— 220	— 280	—255	—265	—245
Africa				.....	— 10
Asia	— 345	— 15	— 30	— 50	— 45
Oceania	— 50	— 40	— 45	— 70	—105
World	+ 130	+ 505	+330	— 95	—695

..... None, small, or not available.

[1]The forward estimates are based on varying hypothetical assumptions as to prevailing economic conditions in the various countries of the world.

[2]Maximum. Only one figure was given for production.

[3]Baltic Republics.

[4]Based on maximum production estimates for the United States.

[5]As indicated in the text, it is generally expected that North America will continue to show a net import balance. The calculation on which these surplus figures are based assumes that maximum production will occur, which is not necessarily true. The surplus indicated here results only from the mathematical calculations.

It should be understood that the figures just quoted refer to net balances and do not indicate actual imports or exports. Indeed, in the case of North America, it is estimated that actual pulp imports from Europe might be in the order of 300,000 to 500,000 tons in both 1949 and 1950, while at the same time total North American overseas exports might be in the order of 250,000 tons, or at about the same level as in 1947 and 1948. This suggests that no substantial quantities of North American pulp will be offered to the traditional markets for European pulp and that the fears of European producers in that connection are unfounded. American purchases of European wood pulp are likely to be substantially larger than the quantities to be shipped from North America to continental Europe.

It should be stressed that the temporary surplus experienced at the end of 1948 referred only to effective demand, and that Europe and large portions of Asia were actually suffering from shortage of paper and other pulp products which were insufficient to meet the desires of the press and other consumers. Although the lack of purchasing power and currency restrictions which accounted for this situation are likely to continue, reductions in the prices of pulps and larger available supplies should, in the near future, somewhat ease the acute shortage of newsprint and other papers in war-affected regions.

Long-Term Outlook

The Conference devoted considerable attention to the prospective wood pulp situation in 1955 and even attempted to make certain estimates which are summarized by regions in the various tables of this report. These figures should be considered with extreme caution, not only in view of their tentative nature, but because only a limited number of countries were prepared to present estimates. Hence the Conference had to take on itself the task of assessing the future developments in a number of countries some of which, like Sweden and Finland, are among the most important wood pulp producers.

A further general qualification of all figures for 1955 is necessary as a result of the usual tendency in forward estimates to exaggerate future requirements and to underestimate prospective production. Allowance for this error suggests that the two percent deficit between world requirements and production in 1955 shown in Table 1 is not likely to occur, and that a satisfactory balance between production and requirements may be anticipated for 1955 if the assumptions underlying the estimates in Table 1 are realized and the necessary pulpwood is available.

Finally, it should be stressed that the figures listed for 1955 do not represent forecasts in the usual sense, but rather indicate expectations for the production and consumption of wood pulp in individual countries. These expectations are based for many countries on the assumption of full employment and continued economic expansion, and are bound to undergo modification under the impact of subsequent developments, including considerations arising from the balance of payments of various countries. Moreover, forecasts may be revised in some important respects in the light of the findings of this Conference. Since it was the purpose of the Conference to attempt a regional and world-wide review of programs for wood pulp production and distribution, *a revision of these expectations as a result of its findings would implement one of the major purposes which it hopes to achieve.*

Consumer Needs

Pulp requirements arise from the needs of paper and other industries manufacturing an ever-growing variety of pulp products such as newsprint, other printing and writing papers, wrappings, paperboard, building boards, rayon, etc. The output and hence the requirements of these pulp and processing industries is in turn determined by the effective demand of consumers for their products.

Without attempting an assessment of consumer needs[1] for paper and other pulp products, the Conference felt that the trend of pulp requirements for the period 1948-1955, as shown in Table 1, appears adequate to cover the needs of consumers in different parts of the world in terms of effective demand and purchasing capacity. It appears unlikely that substantially larger amounts of paper and other pulp products could be imported and bought even if they were available. On the other hand, the Conference was not certain whether pulp production in 1955 would actually reach the projected levels, mainly on account of raw material shortages in Europe and Japan which are discussed later in this report.

A more detailed examination of needs for pulp products was beyond the scope of the present Conference. To assess these needs it would be necessary to consider not only the desirable and the possible trends in the consumption of paper for educational purposes and for packaging, and in the manufacture of rayon for clothing and for industrial purposes, but also to determine the extent to which the purchasing power of consumers and the balance of payment of countries that import paper and rayon would make it possible to meet these needs.

Moreover, increasing amounts of straw, bamboo, waste paper, and other raw materials are used in addition to wood pulp for papermaking, and all these materials must be taken into consideration in any attempt to establish a balance for paper and other pulp products. These additional raw materials, although of agricultural or forestry origin, were not included in the terms of reference of the present Conference, which was therefore unable to give to them that thorough consideration which their importance may justify.

The Conference, however, noted the concern of the Director-General of UNESCO about the fact that cultural progress in the less developed countries is delayed through inadequate supplies of printing papers while, in many of the more advanced countries, postwar shortages of paper still interfere with the normal functioning of the press and the restoration of educational facilities.

The Conference was unanimous in appreciating the importance of adequate paper supplies for mass education and information and agreed that larger paper supplies for these purposes are eminently desirable. Many delegates believe that an assessment of present and prospective consumer needs for pulp products would constitute a valuable supplement to the information on wood pulp contained in the present report.

[1] "Needs" is used in this section to indicate consumer requirements irrespective of economic or physical possibilities for meeting them.

Production and Requirements

In addition to the general reservations that apply to all forecasts of requirements, the estimates of wood pulp requirements in 1955 attempted by the Conference call for further qualification. For many years pulp producers have attempted to integrate their operations with the manufacture of newsprint, paperboard, and a few other mass products in a continuous-flow operation. This tendency is not only in line with the general economic policy of countries to produce fully manufactured rather than partially manufactured products, but also tends to render the production process more efficient and to reduce shipping costs.

In pursuance of this policy the major pulp producing countries have undoubtedly included in their forward estimates for pulp requirements provision for additional exports of finished products. This may reduce the export possibilities of countries which had hitherto imported substantial amounts of pulp for re-export in the form of paper and similar products, but it is unlikely that these reductions were fully considered by the latter group; the requirement estimates in Table 1 might therefore be on the high side.

It should also be remembered that a number of less developed countries are about to set up their own pulp industries which would supply local paper mills which hitherto had to import all their wood pulp from Europe and North America.

The Conference believes that these tendencies toward the local integration of pulp and paper manufacture, while perhaps inevitable, may endanger the continued existence of converting industries in a number of pulp importing countries. The Conference envisages the maintenance of pulp exports at levels which would permit the continued activity of existing pulp converting industries, but calls attention to the danger of any expansion of pulp converting industries in countries which do not have an assured and continuous supply of pulp from domestic or nearby sources.

With due consideration to the preceding qualifications, Table 1 indicates that pulp requirements in 1955 will be roughly 10 million tons or almost 40 percent higher than in 1948. This increase at an annual rate of about 5 percent is indeed very substantial, especially when compared to an increase of only 3.7 million tons or 15 percent between 1937 and 1948, corresponding to an annual expansion of 1½ percent. It is true that the past 11 years have been disturbed by a world war whereas the forecasts for 1955 assume a period of peaceful expansion.

The Conference estimates show approximate equilibrium between world production and requirements for 1948 to 1955. If these figures are confirmed by subsequent developments, there should be no major wood pulp surplus or deficit during the period under review.

On the other hand the estimates indicate a significant change in the world distribution of wood pulp as shown in Table 2.

The Conference estimates indicate a change in Europe's position in the world pulp picture. Before the war this continent was the major source of wood pulp exports to the rest of the world with a net export of roughly two and one-half million tons. At present, Europe is still a net exporter of wood pulp although on a smaller scale, but European requirements by 1955, according to Table 1, would be in excess of European production. Such a situation, if it should develop, could be corrected by smaller over-all requirements or by such increases in the wood pulp production in northern Europe as may be necessitated by economic circumstances and by consideration of commercial policy. Yet, according to general trends, each of the major regions of the world would have to supply by 1955 most of its own pulp, notwithstanding the possible continuation of certain transoceanic pulp shipments.

The Conference has tentatively estimated wood pulp exports of the U.S.S.R. at 200 thousand tons for 1955. It believes that this is a cautious estimate and that a substantially larger supply might be forthcoming from this source.

Between 1948 and 1955, North America's wood pulp requirements show an increase of 4.5 million tons or 23 percent compared to an estimated 80 percent increase for Europe and even larger proportional increases for Oceania, Asia, and Latin America. The gradual leveling off of the rising curve in North America's pulp requirements must be attributed mainly to the exceptional increase during the first postwar years, whereas, conversely, European output from 1946 through 1948 was restricted by raw material shortages and other post-war conditions.

In 1955 world pulp consumption may be roughly 50 percent higher than in 1937; but Europe's requirements for the same period may only be expected to increase by 19 percent and Asia's requirements may still be down by 40 percent.

Raw Materials

The Conference was in unanimous agreement that no pulp factory should be built without being assured of a continuous supply of raw materials based on sustained forest yield. In general, pulp should be produced where mills can be supplied with pulpwood in an economical way.

TABLE 2.—DISTRIBUTION OF WOOD PULP CONSUMPTION AND PRODUCTION, BY REGIONS

Regions	1937		1948		1955	
	Consumption	Production	Consumption	Production	Consumption	Production
	(Percent)					
Europe	42	49	25	29	31	30
Near East	—	—	—	—	—	—
North America	51	46	70	68	63	65
Latin America	1	—	2	1	2	1
Africa	—	—	—	—	—	—
Asia	6	5	2	2	2	2
Oceania	—	—	1	—	1	1
TOTAL	100	100	100	100	100	100

— Less than 1 percent.

There are exceptions to this rule: e.g., the transport cost of wet pulp is so high that it is cheaper to import pulpwood; it also might be necessary to maintain in existence, for social, political, and humanitarian reasons, established pulp mills which have to rely on pulpwood imported from considerable distances. Such mills may eventually be able to replace imported pulpwood with other raw materials from nearer sources, although such a replacement would presumably entail considerable investment in new equipment.

In this connection, progress in the manufacture of pulp from temperate zone hardwoods, tropical woods, residual straws, and grasses warranted particular consideration by special working groups of the Conference.

Table 3 reveals for 1955 a prospective trade deficit of from 6 to 7 million cubic meters; additional imports of that magnitude would be needed to achieve the anticipated pulp production of 36.9 million tons. This trade deficit and the shortages of pulpwood supplies in Europe and Japan do not mean that it would be impossible to attain by 1955 a world production of 36 million tons of pulp or even more. But the figures assembled in Table 3 indicate that, unless prospective supplies of pulpwood or other fibrous materials can be increased through large imports from the Soviet Union or by technical improvements, such as integration of forest industries, a considerable change in the location of pulp capacity may have to take place if the anticipated production is to be reached. To explore this problem further the Conference decided to review the position by regions.

Europe

Last year's pulp production in Europe was not quite two-thirds of prewar, but by 1955 European nations expect to regain 90 percent of their prewar output. This would require approximately 48 million cubic meters of pulpwood which, according to Table 3, exceed European pulpwood supplies by roughly 3.6 million cubic meters. This situation exists in spite of the fact that for the continent of Europe taken as a whole forests are at present being overcut to the extent of 20 percent of annual growth. In some cases,

TABLE 3.—PULPWOOD: MINIMUM REQUIREMENTS AND SUPPLIES[1]

Country and Region	1937			1949			1955		
	Consumption	Cut	Net Trade Exp. + Imp. —	Consumption	Cut	Net Trade Exp. + Imp. —	Consumption	Cut	Net Trade Exp. + Imp. —
	(1,000 cubic meters, solid volume)								
Europe									
Austria	.....	1,900	+ 500	1,400	1,250	— 150	2,000	2,000	.....
Belgium	.....	.....	— 180	190	175	— 15	200	185	— 15
Czechoslovakia	.....	2,300	+ 370	1,236	1,800	+ 564	1,488	1,800	+ 312
Denmark	17	17	.....	3	3	.....	11	11	
Finland	.....	10,400	+1,540	7,500	8,000	+ 500	8,000	8,500	+ 500
France	.....	600	— 800	1,960	910	—1,050	2,360	1,510	— 850
Germany	.....	5,700	—3,140	.....	.....	.....	.....	.....	.....
Bizone	.....	.....	.....	2,550	2,150	— 400	3,500	1,500	—2,000
French Zone	.....	.....	.....	660	2,210	+1,550	1,030	1,030	.....
U.S.S.R. Zone	.....	.....	.....	1,660	1,660	.....	1,961	1,961	.....
Hungary	.....	.....	— 25	15	15	.....	15	15	.....
Italy	.....	800	.....	850	850	.....	1,200	900	— 300
Norway	.....	5,300	— 560	3,950	4,000	— 50	5,050	5,000	— 50
Poland	.....	1,200	+ 340	800	800	.....	1,200	1,200	.....
Sweden	20,000	18,200	— 170	17,200	17,000	— 200	17,200	17,000	— 200
Switzerland	360	240	— 120	450	450	.....	450	400	— 50
United Kingdom	.....	.....	— 330	210	90	— 120	510	90	— 420
Others[2]	.....	1,300	— 420	1,000	800	— 200	1,800	1,300	— 500
TOTAL	.....	47,955	—2,995	41,635	42,165	+ 430	47,975	44,400	—3,575
U.S.S.R.	.....	6,700	+2,820	.....	.....	.....	.....	.....	.....
North America									
Canada[3]	16,925	20,787	+4,057	26,118	30,884	+4,766	28,249	31,798	+3,549
United States	26,505	20,000	—3,820	50,490	45,645	—4,845	64,856	59,872	—4,984
TOTAL	43,430	40,785	+ 235	76,610	76,530	— 80	93,105	91,670	—1,435
Asia									
Japan[4]	.....	3,500	.....	1,700	1,645	— 55	3,400	1,800	—1,600
Oceania									
Australia	.....	.....	.....	311	311	.....	555	555	.....
New Zealand	.....	.....	.....	30	30	.....	530	530	.....
TOTAL	.....	.....	.....	340	340	.....	1,085	1,085	.....
GRAND TOTAL	.....	.....	.....	120,285	120,680	+ 295	145,565	138,955	—6,610

NOTE: This table is based on minimum estimates of future consumption rather than a maximum estimate. The difference between minimum and maximum totals for Europe where the most critical pulpwood situation exists is relatively small. The difference between minimum requirements for the United States on the other hand is relatively large. Use of maximum estimates on a world-wide basis, therefore, might give an apparent world import deficit of pulpwood so large as to appear unrealistic.

..... None, small, or not available.

[1]The forward estimates are based upon varying hypothetical assumptions as to prevailing economic conditions in the various countries of the world.

[2]"Others" include Portugal, Yugoslavia, Bulgaria, Rumania. Some of these may have export surpluses; but the group also includes the Netherlands which will require imports of at least 500,000 cubic meters by 1955.

[3]Includes Newfoundland.

[4]Japan proper.

however, and in particular in northern Europe, annual drain is in line with annual growth.

In prewar years, Europe's pulp industry relied on an annual import of 3 million cubic meters of pulpwood which came almost entirely from the present area of the Soviet Union. The Conference feels that a resumption of pulpwood exports from the U.S.S.R. on the prewar scale is unlikely.

In that case, Germany, France, and, to a smaller degree, the United Kingdom and Switzerland might be compelled to reduce their production below the 1955 estimates.

It should be stressed that if lack of pulpwood compels European nations to reduce pulp production approximately one million tons these countries might need to import more pulp or paper from the Western hemisphere. If such additional imports were to offset the reduction in pulp output, the result at present prices would be a deterioration of Europe's dollar position by an amount well in excess of 100 million dollars. If, on the other hand, European countries could find the necessary pulpwood or other raw material to maintain production, such imports, if obtained from eastern Europe, would cause no dollar drain; if the pulpwood were supplied from North America, it would create a dollar liability at the maximum in the order of 20 to 30 million dollars.

It is possible that an increase in the raw material supplies for European mills can be achieved to some extent by closer utilization of sawmill waste, greater use of hardwoods and alternative raw materials, the introduction of high yield pulping methods, and possible diversion of some fuelwood or other timber to the pulp mills. The active programs of research under way in Finland, Sweden, and other countries may lead to more efficient use of raw materials. Further wood pulp capacity, either newly built or transferred from other areas, might be supported in certain central and eastern European countries which at present do not make full use of smaller wood from their forests or the wood refuse from their sawmills.

U.S.S.R.

No detailed information is available with regard to the pulp capacity or production of the Soviet Union. Before the war that capacity amounted to approximately one million tons annually and it is understood that great efforts are being made to expand the pulp and paper industry as rapidly as possible. It is known that the undeveloped forests of the Soviet Union are of enormous extent, consequently the prospects for future output are very high. On the other hand, Soviet reports indicate that the forests of western Russia were seriously overcut for many years prior to 1936 and war damage in that region was undoubtedly great. In consequence, it is not impossible that all the pulpwood that can be produced west of the Urals will be needed for domestic production.

North America

The consumption of pulpwood in North America increased by 75 percent from 1937 to 1949 and a further increase of 20 percent is anticipated by 1955. Canada exports large quantities of pulpwood to the United States and small amounts across the Atlantic, but no pulpwood is imported from other regions. It is believed that forest resources now accessible are capable of maintaining supplies of wood adequate for current production levels. From the medium and long-term points of view, great opportunities exist for still further expansion as more and more of the forest area is subjected to improved forest management and to more adequate protection against fire, insects, and diseases, and the industry makes greater use of hardwoods and wood now wasted and introduces high yield pulping methods. In addition, there remain large forest areas not yet fully utilized, notably in the northern parts of Canada, Alaska, and portions of the Rocky Mountain area. Plans for bringing the forests of Alaska into production are already far advanced.

Near East and North Africa

There is no wood pulp production in this region because of almost complete lack of forest resources. The only country where small-scale development might be possible is Turkey. All paper requirements of the region must be imported.

Africa (except North Africa)

A small quantity of chemical pulp is produced in the Union of South Africa, wood supplies being obtained from plantations of "exotic" species. While it is understood that some expansion of capacity is contemplated in the Union, all of it will be needed for home consumption. In the remainder of the continent there are estimated to be about 300 million hectares of forests of productive quality, but virtually the whole area is occupied by broadleaved species. Much of it is tropical rain forest. The problems of adapting such species to the commercial production of pulp have not yet been fully solved, nor had a systematic program of research been undertaken until recently. The Conference noted with great interest a report by the French Delegation regarding the successful conclusion of experiments for the pulping of a considerable number of species. Mixtures of as many as 24 tropical species have been successfully digested in a commercial plant in France and sample lots of good paper have been made from the resulting pulp. A pilot mill is under construction on the Ivory Coast to determine the practical possibilities on a commercial scale.

Latin America

The population of this region, estimated to be 150 million people, is about equal to that of North America, yet pulp production is very small. The larger part of it is carried on in Brazil and Mexico, and is based upon raw materials from local coniferous forests. Latin America, however, contains about 715 million hectares of productive forest land, although only 3½ percent of this vast area carries conifers. Here, as in Africa, the possibilities for augmenting world pulp supplies are enormous providing that the social, technical, and economic problems connected with the utilization of tropical forests can be solved.

Asia and Far East

Pulp production in Asia fell from 1.5 million tons in 1937 to 0.5 million tons in 1948, largely because of the changed situation in Japan. Reports indicate that Japanese forests have for some years been heavily overcut and until the benefits of reforestation have been realized the prospects for obtaining more pulpwood are negligible. Plans to increase Japanese pulp output to 880,000 tons by 1955 depend on the possibilities of securing large imports of pulpwood not yet

in sight, or on developing alternative raw materials such as rice straw.

In India, at least one new pulp mill is planned for erection in the near future, but in most parts of the country the local forest resources appear insufficient to support a large wood pulp industry in addition to other demands of the increasing population. The Conference was advised that there are large forest resources of species highly suitable for pulp manufacture in the North, and that the real difficulty at the moment is the lack of accessibility to such regions.

The situation in China precludes any estimate of future possibilities. It is believed that here again there are substantial forests located in areas very remote and difficult of access, but in the thickly populated areas the supplies of wood which might be converted into pulp are small. It is possible that substantial pulp production may eventually be developed on the basis of bamboo.

In other countries of Asia, including Burma, Thailand, Indochina, Malaya, and the Philippines, there are extensive forests, but most of these are broad-leaved types. Indonesia also has vast tropical forests and, in addition, a considerable area of pine. Plans for a sulphate mill to be supplied by this pine were interrupted by the war but are once more under active study.

Oceania (Australia and New Zealand)

The Conference was informed that the present small production in New Zealand of 24,000 tons annually is to be increased to 135,000 tons by 1955 and may eventually reach 250,000 tons. This development is made possible by the extensive "exotic" forests of insignis pine and other conifers, whose rate of yield under New Zealand conditions is phenomenally high.

Australia produced 136,000 tons of pulp in 1948 and expects to increase her output to 210,000 tons by 1955. This will be done entirely on the basis of domestic forests. In view of their active forestry programs, it seems possible that the principal countries of this region may eventually be able to supply all or most of their own requirements for pulp.

World Trade in Wood Pulp

In 1948 world trade in pulp was still only around 70 percent of prewar. The reduction was attributable entirely to Europe with exports below 60 percent of 1937 and imports on a slightly higher level.

Despite this decline, Europe remains the center of world pulp export trade. In 1937 pulp exports came from only two regions and of these Europe accounted for 80 percent, with North America contributing the rest. It should be stressed that both in Europe and in North America most of the pulp trade takes place within each continent. Before the war, only a very slight percentage of North America's pulp exports were exported from this continent, and less than one-third of European exports went overseas. Yet with these exports Europe, and in particular the Scandinavian countries, practically covered the pulp import needs of the rest of the world.

In 1948 Europe's pulp exports had fallen from 80 percent to 60 percent of the world total but were still roughly twice as high as North America's. Since most of North America's pulp exports continued to move between Canada and the United States, Europe retained its position as the major source of market for all continents except North America.

Conference estimates indicate a gradual expansion of world pulp trade. In 1949 and 1950 it is anticipated that total exports will remain around 80 percent of prewar, but they are expected to exceed the 1937 figures by some 10 percent around 1955. Europe would account for not quite 60 percent of that total, and the remaining 40 percent would be contributed by North American exports. If this assumption proves right, it will mean that North American pulp exports will no longer be mainly confined to intra-continental movements.

At present, monetary restrictions, currency fluctuations, and artificial exchange rates are distorting the distribution of market pulps throughout the world. Until some over-all solution of these distorting factors is achieved, both producers and consumers of wood pulp everywhere face constantly changing conditions which interfere with normal trade.

Pulpwood

Current Consumption and Future Outlook — A report by FAO to the Montreal Conference

BEFORE entering into a discussion of pulpwood consumption and supplies, it is desirable to take note of certain characteristics of the wood pulp industry, and of the current demand for pulp and its products, which are specially significant from the forestry point of view.

First, the modern pulp mill represents a large amount of fixed capital. If pulp mill and paper mill are combined, the investment tied up in one place is very much larger. Such investments can only be liquidated over considerable periods of time, consequently the builders of a pulp mill must be assured of an adequate and permanent supply of raw material. Thus the pulp industry is specially dependent on forests managed on a sustained yield basis rather than on short-term liquidation of forest growing stock.

Second, the wood pulp industry in many countries has grown up in conjunction with the older sawmill industry. Very often it draws its raw material from the same forest that supplies sawlogs. Joint opera-

tion of pulp mill and sawmill facilitate use of sawmill waste for pulp manufacture. But the management of such a combined operation must, from time to time, decide on the most profitable basis for dividing supplies of raw material between the principal end products. What is true of a single venture may also apply at the national level.

Third, the wood pulp industry has expanded rapidly and there is every reason to expect that demand for its products will continue to grow.

Fourth, although at present the extraordinary demand for pulp in North America appears to be leveling off, the current level is a very high one. In Europe and in other regions effective demand is limited by lack of purchasing power and by exchange difficulties; but improvement of economic conditions in the countries concerned would certainly be followed by sharp increases in their demands for pulp or its products. Such increased demands may develop quickly, hence it is important to determine whether the forests now producing most of the world's pulpwood could, in their present condition, sustain an increased drain.

Production of Pulpwood

Estimated world production of pulpwood in 1947 was 119 million $m^3(r)$ or about 46 million cords.[1] In 1937 production was estimated to be 100 million $m^3(r)$, indicating an increase of 19 percent in the ensuing decade. Production actually reported to FAO for 1947 totaled 96 million $m^3(r)$, most of the estimated difference being attributable to the U.S.S.R., the Soviet Zone of Germany, Czechoslovakia, Hungary, Rumania, and Yugoslavia, for which figures are not available.

The significance of wood pulp in relation to total world consumption of forest products is shown by Table 1. Quantities are expressed in equivalent volumes of roundwood from which the various products were made.

Table 1.—Estimated World Consumption of Wood and Wood Products, 1947

Commodity	Equivalent Volume million $m^3(r)$	Percent of Total
Fuelwood	825	57
Sawn lumber	360	25
Wood pulp	119	8
Other industrial wood	149	10
Total	1,453	100

In the absence of complete data it is estimated that about 56 percent of the world's pulpwood supply was produced in North America, 26 percent in Europe, 16 percent in the U.S.S.R., and 2 percent in all other regions.

Output of pulpwood in individual countries reporting to FAO is shown in Table 2. Other countries producing pulpwood but from which reports were not received, or which did not report pulpwood separately, include Argentina, Belgium, Bulgaria, Chile, Czechoslovakia, India, Hungary, Pakistan, Rumania, Soviet Zone of Germany, U.S.S.R., and Yugoslavia.

[1] $m^3(r)$ = cubic meter of roundwood, solid volume, without bark.

1 cord = 128 stacked cubic feet.

Countries tabulated produce 80 percent of the world's pulpwood, at least four-fifths of the remainder being attributable to the U.S.S.R.

Available figures for 1947 indicate that 92 percent of all pulpwood was from coniferous species and only 8 percent from broadleaved trees.

Table 2.—Pulpwood Production, 1947
Countries Reporting to FAO

Country	Conifers (softwoods)	Broadleaved (hardwoods)	Total	Percentage of total cut of all products
	(1,000 m^3 (r))			*Percent*
Europe				
Austria	749	53	802	7.9
Denmark	4	—	4	0.3
Finland	9,000	—	9,000	[1]19.0
France	593	35	628	2.8
Germany:				
Bizone	1,418	266	1,684	4.5
French Zone	1,588	128	1,716	11.9
Italy	92	128	220	1.3
Norway	3,500	—	3,500	[1]35.0
Poland	518	2	520	4.6
Sweden	9,000	300	9,300	24.7
Switzerland	197	—	197	4.9
United Kingdom	[2]16	—	16	0.6
Near East and North Africa				
Turkey	43	—	43	0.6
North America				
Canada	26,693	1,204	27,897	33.0
Newfoundland[3]	2,265	—	2,265	62.2
United States	31,718	5,154	36,872	13.3
Latin America				
Mexico	14	—	14	0.4
Brazil	103	25	128	0.1
Africa				
Union of S. Africa	7	—	7	0.4
South and East Asia				
Japan	741	39	780	2.0
Southern Korea	7	—	7	0.2
Oceania				
Australia	57	312	369	2.6
New Zealand	26	—	26	0.9

—None.

[1] Estimated from incomplete data.

[2] State forests only.

[3] Now a Province of Canada.

International Trade in Pulpwood

The major international movement of pulpwood in 1947 was from Canada to the United States. Shipments were in the order of 5,000,000 $m^3(r)$. There were also small shipments of pulpwood in the opposite direction. This trade, which in 1947 accounted for somewhere between 70 and 75 percent of all international movements of pulpwood, is of long standing, but the probabilities are that its volume will be reduced in future. For example, the Province of Ontario announced two years ago that exports of pulpwood from its publicly owned forests would gradually be eliminated within a ten-year period.

Second in importance as an importer of pulpwood in 1947 stood France, which received 962,000 $m^3(r)$ from Germany, 21,000 from Canada, 19,000 from Finland, and 9,000 from Switzerland.

Finland reported exports of 209,000 $m^3(r)$ to the U.S.S.R., with smaller shipments to European countries totaling 91,000 $m^3(r)$.

Sweden reported imports of 202,000 $m^3(r)$ from Norway and shipments to Norway of 105,000 $m^3(r)$, giving an import balance of 97,000 $m^3(r)$.

Switzerland received 133,000 $m^3(r)$, and Austria 81,000 $m^3(r)$, from neighboring countries.

The Netherlands received 28,000 $m^3(r)$ from Canada and 21,000 from Finland.

The United Kingdom imported 163,000 $m^3(r)$ from Newfoundland and 2,000 $m^3(r)$ from Finland.

It is probable that the U.S.S.R. received some supplies of pulpwood from southeastern European countries, in addition to wood imported from Finland, but no information as to quantities is available.

New Zealand exported 2,000 $m^3(r)$ to Australia.

No exports or imports of pulpwood were reported from the Near East, Africa, Latin America, or Asia.

These brief notes practically cover the whole of international trade in pulpwood. They lead to certain important conclusions:

1. Only about 6 percent of the pulpwood produced moved across national boundaries in its unmanufactured state. Three-quarters of this small fraction is accounted for by United States imports from Canada.
2. Only 227,000 $m^3(r)$ were exported across the ocean.
3. From the above it may be concluded that under certain circumstances it is mutually profitable to move pulpwood from one country to another, within a region; but ocean shipments are very small. It appears that each major region of the world must rely primarily for its pulpwood supplies on forests within its own borders.
4. There is a growing tendency for individual countries to manufacture their own raw materials, including pulpwood.

Outlook for Pulpwood Supplies in Principal Producing Countries

Since all signs point to an increased demand for wood pulp in the years to come, it is necessary to examine the relationship between the current rate of consumption of the raw material, pulpwood, and the rates of production (or growth) in the forests now supplying it. We have seen that more than 90 percent of the output is now taken from coniferous or softwood forests.

It cannot be emphasized too strongly that it is quite impossible to discuss forest productivity in terms of pulpwood alone. Instead, we must consider the capacity of forests to withstand, without suffering devastation, the joint demands made upon them for sawlogs, other industrial wood, fuelwood, and pulpwood.

In the following discussion the term "net growth" will be understood to mean the difference between total growth and natural losses caused by fire, insects, disease, and windstorms. It is "net growth" which must offset the volume of fellings. But fellings actually permitted within an individual forest may differ from estimated net growth in order to implement plans for improvement of the condition of the forest.

If net growth and drain for all products are equal, then an immediately increased supply of pulpwood can only be obtained from that forest by diverting part of the sawlogs, fuelwood, or other products to the pulp mill, or by deliberately overcutting. The latter policy, if persisted in, will inevitably lead to the destruction of the forest. In the long run, it is possible to alter the management of the forest so as to increase the output of pulpwood, but this would ordinarily imply a corresponding reduction in sawlog supplies.

The following notes on individual countries, then, refer to production of all forest products, rather than to production of pulpwood alone. They are based on statistics appearing in FAO's *Yearbook of Forest Products Statistics—1948* and in the statement "Forest Resources of the World."[2] In a few cases it has been necessary to draw on other sources in order to obtain a reasonable estimate of the current position.

European Countries

Austria. Total fellings in 1947 exceeded net growth by 10 percent.

Denmark. According to reports received, growth and fellings are practically in balance.

Finland. A report published by the Bank of Finland states that annual average fellings during the period 1945-47 amounted to 48 million $m^3(r)$, as compared with annual growth of 41 million $m^3(r)$, indicating an overcut in the order of 17 percent. A report for 1948 indicates that growth and fellings were in balance last year.

France. Volume of production in 1947 was reported to be 22.6 million $m^3(r)$, as compared with net growth of 28.6 million. Since there are known to be important differences in methods of computing wood volumes for industrial and forestry purposes and forestry statistics show average annual deficits in the order of 8 percent for the decade 1937-46, the apparent surplus in 1947 should be viewed with reserve. It seems unlikely that France is in a position to increase her pulpwood output at the present time.

Germany—Bizone. Fellings exceeded growth by 140 percent.

Germany—French Zone. Fellings exceeded growth by 185 percent.

Italy. Estimates for annual growth are not available, but partial information indicates that an increase in the 1947 felling rate should not be contemplated.

Norway. It is estimated that net growth and fellings are approximately in balance.

Poland. Fellings exceeded growth by 11 percent.

Sweden. Production was reported to be 37.6 million $m^3(r)$, as compared with net growth of 45.6 million m^3 (r), indicating a surplus of 18 percent. It is understood, however, that the surplus accrues mainly in the southern part of the country and that some curtailment of pulpwood fellings has become necessary in the north.

Switzerland. Fellings exceeded growth by nearly 50 percent.

United Kingdom. Reports of fellings in 1947 are incomplete; but the devastation of the forests during the war makes it certain that the United Kingdom will be unable to increase pulpwood output substantially for many years to come.

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[2] *Unasylva* II, 4, p. 161.

Summary for Europe

The above notes show that most of the European countries mentioned overcut their forests in 1947, the exceptions being Denmark, France, Norway, and Sweden. Even in these four countries the possibilities of increasing pulpwood output in the immediate future are slight. For the group of countries as a whole, a reduction in the current rate of total fellings seems imperative. In 1948 the European Forestry and Forest Products Commission estimated that the forests of the continent were being overcut to the extent of 20 percent of net growth.

While the need for lumber, pitprops, railway sleepers, poles, piling, and other products for reconstruction of war damage and further industrial development remains acute, increase of domestic supplies of pulpwood seems extremely difficult.

On the other hand, pulpwood comprises only about 11 percent of Europe's total fellings, and most of it is taken from the smaller trees, including thinnings. Therefore, it may be possible to maintain pulpwood supplies at the 1947 level even if some reduction in total output is effected in order to give the forests a chance to recuperate from overcutting and neglect during the war years.

Forest inventory statements received from 17 European countries show that overcutting exists in the broadleaved portion of the forests as well as in the conifers—hence there is little possibility of obtaining more pulpwood through more extensive use of the broadleaved species in the pulping processes. In certain localities this course may prove practicable, but for the continent as a whole it holds little promise.

The seriousness of the European pulpwood situation, from an industrial point of view, arises from the fact that full use of installed capacity in 11 of the countries[3] listed in Table 2 would require 39.8 million $m^3(r)$ of pulpwood annually, as compared with actual consumption in 1947 of about 25.1 million. These figures are based on conversion of quantities of pulp capacity and production appearing in the report "World Wood Pulp Data, 1947-48"[4] to equivalent volumes of roundwood. Furthermore, European pulp output in 1948 was nearly 10 percent higher than in the previous year. On the basis of 1947 figures the increase in pulpwood supplies required for full use of existing capacity in the above-mentioned countries would be nearly 60 percent. Obviously, no such expansion of output can be obtained from forests already being overcut.

Aside from further forest devastation, there appear to be only three short-term possibilities for obtaining additional wood. The first of these lies in more complete utilization of sawmill waste. Such utilization of waste is already highly developed in the three northern countries—Finland, Norway, and Sweden—which possess 77 percent of the total capacity; but possibilities in this direction should be explored, especially in central and eastern Europe.

The second possibility is increase of imports. For economic reasons, these must come chiefly from eastern European countries or the Soviet Union. In 1936 the U.S.S.R. and Baltic States, Czechoslovakia, and Poland exported 2.9 million $m^3(r)$ to Germany and 1.4 million $m^3(r)$ to western European countries. Even if this trade could be restored to the relatively high 1936 level, it would fall far short of meeting the needs of installed capacity. In view of the efforts being made to develop manufacturing industries in former pulpwood exporting countries, the prospects for increased exports to the west are not too encouraging at the moment.

The third possibility is that of diverting part of the wood now used for fuel to the production of pulp. This course was followed by Germany with considerable success before the war, but requires the supply of additional mineral fuel.

It seems that we must accept the fact that the wood pulp industry of western and northern Europe, including Germany, is seriously overbuilt. This does not mean, of course, that no opportunities exist for erecting new mills in selected localities on the continent, and partial information available at this time suggests that such developments may be possible in central and eastern Europe. Probably redistribution of some of the excess capacity would be beneficial, and at least one transfer of a closed mill, from Sweden to Yugoslavia, has been reported to be under consideration.

The average rate of growth in the forests of Europe is about 2.2 $m^3(r)$ per hectare, and it is believed that eventually it may be possible to increase the average to 3.0 $m^3(r)$, or by 36 percent, through the adoption of suitable measures in the forests. This, however, will take much time as well as much effort. Comparison of this percentage increase with the increase of nearly 60 percent in pulpwood supplies needed to fully utilize existing pulp capacity indicates that, even if imports into western Europe can be increased substantially, the existing level of capacity should not be increased.

Union of Soviet Socialist Republics

Direct reports from the U.S.S.R. are not available. However, a book published last year by two Russian forest economists, states that the area of "continuous" forest is 700 million hectares, annual growth is 700 to 800 million $m^3(r)$, and planned output of all forest products in 1950 will be 280 million $m^3(r)$. Planned deliveries to the pulp and paper industry are to be from 30 to 35 million cubic meters.

Comparison of the planned output with estimated present growth indicates the immense possibilities for expansion that exist. Furthermore, it seems likely that, when all productive forests are brought under management, the annual growth figure can be substantially increased.

Unfortunately, there is no way of estimating what supplies of pulpwood or of pulp and pulp products European countries may expect to import from the U.S.S.R. in the near or distant future.

North America

Canada. Up to the present time, it is only possible to estimate by indirect means the relationship between total growth in the forests and total drain due to natural causes and fellings. Replacement of drain requires an average growth of less than 1 $m^3(r)$ per hectare—a figure which may be compared with national averages of from 2.0 to 2.2 $m^3(r)$ per hectare in the Scandinavian countries. It seems probable that, given more intensive forest management including reduction of the high annual losses from forest fires and

[3]Data are not available for Poland.

[4]By the Canadian Pulp and Paper Association and the United States Pulp Producer's Association.

other natural causes, and with the opening up of nearly 100 milion hectares of productive forest now classed as inaccessible, Canada will eventually be able to sustain in perpetuity an output of forest products of more than double the present volume.

More definite estimates of current growth are needed, although the difficulty of making them under conditions existing in Canada is very great. Until the actual average rates of forest production are known with reasonable accuracy, further expansion of forest industry may be hazardous.

United States of America. A reappraisal of the forest situation in the United States, published last year by the U.S. Forest Service, indicates that total growth and total drain are more or less in balance. There is, however, an indicated overcut of 23 percent in the coniferous forests which provide 85 percent of all the pulpwood cut. This is approximately offset by an undercut of broadleaved species. But the larger sizes of trees which currently make up a major part of the pulpwood supply are being overcut at the rate of 50 percent.

Evidently, there are opportunities for expanding the supply of broadleaved pulpwood; but even the current deficit on the coniferous side of the account has a different significance from that in Europe. Forest management in the United States is as yet only in its beginnings and, in some regions, utilization can be greatly intensified. For example, if actual shortages of pulpwood should threaten in the great pine forests of the South, large additional yields of coniferous pulpwood could be obtained in two or three decades from new plantations. On the West Coast more complete harvesting of small logs left behind by mechanized logging of virgin timber could yield important additional supplies of pulp species. A start in this direction has been made; also, new pulp mills have been erected near large sawmills and obtain part of their raw material from sawmill waste.

The U.S. Forest Service estimates that domestic production of pulpwood, which amounted to 36.9 million $m^3(r)$ in 1947, can be increased sufficiently through intensified forest management and more complete utilization of hardwoods and sawmill refuse to meet an estimated requirement of 102.0 million $m^3(r)$ by the end of this century. It is noteworthy that, while annual pulpwood requirements are expected to increase by nearly 180 percent within the next 50 years, requirements for sawn lumber are expected to remain more or less stable and the output of fuelwood to decrease.

Other Producing Countries

Japan. During recent years the drain on the forest has exceeded annual growth by 100 percent, and this situation is still continuing.

Union of South Africa. Average fellings in 1947 were slightly less than net growth. The pulpwood cut is small and there are no prospects of future export surpluses.

Australia. Available figures indicate an overcut of 62 percent in 1947. This conclusion is tentative and may be revised after further investigation.

New Zealand. Current estimates indicate an overcut of more than 100 percent, for the country as a whole. But the output of pulpwood, which comprised less than 1 percent of total fellings, can probably be increased very considerably, since all of this product is taken from extensive plantations of *Pinus radiata* and other conifers, and these plantations grow at phenomenally high rates.

Information is not available for other pulpwood producing countries but in most of them pulpwood is, up to the present time, a relatively insignificant source of drain on the forests.

The World Outlook

Summing up the forestry situation in the regions reviewed, it appears that there are great long-term possibilities for expansion of the wood pulp industry in North America and in the U.S.S.R. Europe may be unable to increase domestic supplies of pulpwood above the 1947 level, at least for some time to come. The principal countries of Oceania have not yet developed their pulpwood supplies and the pulp industries sufficiently to cover regional needs, and Japan will be unable to expand current production on the basis of her own forests.

No prospects exist for any considerable production of pulpwood in the Near East and North Africa.

In South and East Asia the immense populations of China, India, and Pakistan exert great pressure on their limited forest resources. Some expansion of wood pulp production seems certain to take place in all three countries, but it is likely to be small in relation to population. In these countries there should be great opportunities for the development of large pulp industries using bamboo as the principal raw material. In other countries — Burma, Indochina, Indonesia, Malaya, the Philippines, and Thailand — there are more or less extensive forests but no wood pulp industries. In these countries coniferous forests are of very limited size or entirely lacking and any future wood pulp production must be from tropical broadleaved forests or, perhaps, from planted exotics.

There remain the immense forest regions of Latin America and Africa.

In 1948 combined production of chemical and mechanical wood pulp in Latin America totaled 190,000 metric tons, of which Brazil produced 105,000 tons and Mexico 65,000 tons. The remainder was produced in Chile and Argentina. Installed capacity in the region was sufficient for the production of 255,000 tons.

Brazil reported production of 128,000 $m^3(r)$ of pulpwood and Mexico only 14,000 $m^3(r)$. Most of this wood was of coniferous species.

The estimated area of productive forests in Latin America is 715 million hectares, which compares with 456 million hectares in North America, but only about 3½ percent of its forest is of coniferous species. Most of the forests are of extremely complex tropical types.

In Africa (exclusive of North Africa) there are nearly 300 million hectares of productive forest, mostly of tropical types and with virtually no conifers.

Up to the present time the problems of using tropical forests as a source of raw material for the wood pulp industry have not been fully solved, but it is here that the last great reserves of wood are to be found. The world's growing needs for pulp emphasize the need for energetic programs of research into ways and means, both technical and economic, for bringing these vast forests into production. The growing use

of broadleaved species for pulp in the North Temperate Zone, Australia's successful use of eucalyptus for both chemical and mechanical pulp, and encouraging results of recent experiments on a semi-commercial scale in France, suggest that the tropical difficulties will ultimately be overcome.

The successful use of plantations of exotic pulpwood in New Zealand has been mentioned. It is likely that the same procedure can be adopted in many other countries, particularly those of the Southern Hemisphere.

The Need for Improved Forest Inventories

The preliminary enquiry into world forest resources conducted by FAO points up the need for greatly improved inventories of forest resources in most parts of the world. While many countries have been able to give broad estimates of the extent of their forest areas, relatively few are as yet in a position to estimate timber volumes and annual growth with any degree of accuracy.

On the subject of volumes of standing timber it is particularly noteworthy that, of 101 countries who reported to FAO, 42 were unable to estimate timber volumes and less than 20 were in a position to classify their volumes as between trees of diameters above and below 25 cm.—a subject of considerable importance to the pulp industry. More detailed knowledge is needed to indicate what proportions of the annual yield are best suited for sawing and for pulping.

FAO is doing everything in its power to encourage the preparation of inventories in accordance with actual needs. Modern technical methods are being investigated, and other steps are being taken. Responsibility for carrying out actual surveys, of course, lies with the countries to whom the forests belong.

Until reasonably reliable information respecting the location, extent, nature, and productive capacities of the various forests becomes available, rational development of new forest industries will not be possible. Neither will the countries concerned be in a position to determine what contribution their forests can make to their national economies. It is hoped that the coming years will bring great progress in the surveying of forests, and corresponding improvements in forest management. If these things can be accomplished, forest industries will be given the necessary impetus towards further development, and more wood will become available for the satisfaction of human needs.

Pitprops

European Consumption and Trade

INTERNATIONAL trade in pitprops is on the whole limited to North America, which exports; Europe, which exports and imports; and the Near East, which imports. Some intraregional trade takes place in Latin America, Africa, and Asia, but most of the principal mining countries outside Europe, such as the United States, the U.S.S.R., India, and Australia, are self-sufficient.

The problem of securing sufficient supplies of pitprops is most acute in the coal-producing regions of Europe where there are traditional large-scale net importing countries. For this reason the Timber Committee of the United Nations Economic Commission for Europe (ECE) has had the situation under constant review. This report is limited primarily to Europe and to the current outlook for consumption and trade.[1]

Production and Consumption

Despite earlier fears to the contrary, European supplies of pitprops in 1948 proved adequate for the increased needs of the coal mines and other mining industries.

According to the ECE Coal Committee, hard coal production increased from 431 million metric tons in 1947 to 474 million metric tons in 1948, while the consumption of pitprops rose from 12.55 million m^3 (r) in 1947 to 13.08 million m^3(r) in 1948.

Table 1.—Pitwood Consumption Compared with Hard Coal Production, 1947 and 1948

Country	Pitprop consumption		Hard coal net pithead production	
	1947	1948	1947	1948
	(*1,000 m³(r)*)		(*1,000 m. tons*)	
Austria	173	195	178	150
Belgium	1,021	1,129	24,390	26,691
Czechoslovakia	645	664	16,305	17,745
France	2,588	2,358	45,235	45,100
Germany, Bizone	2,646	2,984	71,129	87,033
Italy	214	[1]180	1,355	975
Netherlands	223	251	10,104	11,032
Poland	1,725	1,934	59,130	70,262
Saar	500	433	10,485	12,560
Turkey	191	198	3,897	4,017
United Kingdom	2,626	2,753	[2]189,394	[2]198,925
Total	12,552	13,079	431,602	474,490

Source: ECE Coal Committee.
[1]Estimated.
[2]Excluding open cast.

Total pitprop supplies available for Europe rose from 13.8 million m^3(r) in 1947 to 14.3 million m^3(r) in 1948, permitting an accumulation of stocks at coal mines and with dealers.

The combined pitprop production of the main coal producing countries—Belgium, Czechoslovakia, France, Bizone, Germany, Netherlands, Poland, and the United Kingdom—was 9.9 million m^3(r) in 1948, an increase of 30 percent over 1947 production of 7.6 million m^3(r). Almost the entire increase was in Bizone Germany, with smaller but considerable increases in Czechoslovakia and Poland.

[1]See "Pitwood," *Unasylva*, Vol. II, No. 4 for information on international trade in pitprops for prewar years, 1946, and 1947. (Note that in Table 7 (p. 201) of that report the second column, showing stocks in mines, 1948, (as at 1 January), should read as follows: Austria, 16; Belgium, 887; Czechoslovakia, 215; France, 1,318; Italy, 126; Netherlands, 144; Poland, 333; Turkey, 121; United Kingdom, 2,006; Saar, 82; Bizone (Germany), 833, and Total, 6,081.)

As will be seen from Table 2, production in Italy, France, and the French Zone of Germany declined considerably, as did export production in Finland.

TABLE 2.—NEW SUPPLY, 1947-1950

Country	1947	1948	[1]1949	[1]1950
	(1,000 $m^3(r)$)			
Austria	212	257	260	280
Belgium	650	700	700	600
Czechoslovakia	351	[1]704	820	820
Finland (exports)	1,610	1,278	1,100	900
France	[2]2,562	2,125	2,600	2,900
Germany:				
Bizone	2,082	4,077	3,500	3,500
French Zone	1,582	1,000	1,010	1,010
Soviet Zone } U.S.S.R. }	692	—	750	750
Hungary	197	[1]100	100	100
Ireland	8	8	11	11
Italy	320	126	180	190
Luxembourg	65	77	85	50
Netherlands	30	29	30	40
Norway (exports)	96	78	80	80
Poland	1,350	1,575	1,766	1,766
Portugal	[3]222	[3]260	165	165
Saar	—	—	30	30
Sweden	220	195	660	400
Switzerland	15	14	5	5
Turkey	148	110	71	71
United Kingdom	572	624	400	400
Yugoslavia	—	—	245	245
Canada (exports)	870	958	700	800
TOTAL	13,854	14,295	15,268	15,113

SOURCE: FAO/ECE Timber Committee.
. . Not available.
[1]Estimated.
[2]Includes 46,000 $m^3(r)$ of German production in 1946, and 2,000 $m^3(r)$ in 1947.
[3]Estimate includes 122,000 $m^3(r)$ pitprops exported in 1947 and 160,000 $m^3(r)$ in 1948.

IMPORTS AND EXPORTS

As pitprop production improved during 1948 in the main consuming countries, international trade decreased. According to the latest reported figures, European pitprop imports from all sources dropped from 4.8 million $m^3(r)$ in 1947, to 4.6 million $m^3(r)$ in 1948. Records of the exporting countries, however, show 1947 exports to European destinations to be 5.1 million $m^3(r)$ and 1948 exports as only 4.1 million $m^3(r)$. The discrepancies between total import and total export figures result, in part, from different interpretations as to what constitutes pitprops or pitwood.

TABLE 3.—PITPROP IMPORTS, 1947 AND 1948

Country	1947	1948
	(1,000 $m^3(r)$)	
Belgium	360.0	249.0
France	71.0	340.0
Germany: Bizone	609.0	502.0
Hungary	72.0	[1]80.3
Italy	3.5	7.2
Netherlands	249.0	217.0
Poland	60.0	—
Saar	[2]480.0	[2]650.0
Turkey	19.8	98.1
United Kingdom	2,872.0	2,432.0
TOTAL	4,796.3	4,575.6

SOURCE: ECE Coal Committee.
[1]January to September only.
[2]Pitwood receipts from abroad for coal and other mines.

OUTLOOK FOR 1949

Plans call for increases in hard coal production of more than 8 percent over 1948 levels. If this comes about, total pitprop consumption in coal mines may approximate 15.2 million $m^3(r)$ or almost 17 percent more than in 1948.

According to figures submitted to the ECE Timber Committee during its fourth session in March 1949, anticipated supplies plus the favorable stock situation indicate that 1949 pitprop requirements will be covered.

OUTLOOK FOR 1950

The total coal mine pitprop requirements for 1950 are estimated at 16.5 million $m^3(r)$ and anticipated supplies (Table 2) to meet these requirements at 15.1 million $m^3(r)$, leaving a deficit of 1.4 million $m^3(r)$. This apparent deficit, although large, is not considered alarming. The estimates are very preliminary, and both supplying and importing countries are naturally cautious in making their forecasts. Domestic production may possibly exceed earlier estimates, and it is well known that certain quantities obtained from local resources frequently do not appear in official statistics. Moreover, North America and the U.S.S.R. could easily cover the deficit if circumstances permitted, and abstention from pulpwood purchases by pulp mills would release roundwood for pitprops.

INFLUENCE OF PULPWOOD ON THE PITPROP MARKET

The tendency of pitprop consuming countries is to restrict purchases abroad to those dimensions and qualities unobtainable at home. Suppliers are therefore obliged to meet more exacting requirements at a time when prices show a downward trend. Quality requirements for pulpwood are less strict, and the demand for pulpwood by those European countries with inadequate domestic resources but high paper-manufacturing capacity is likely to become more insistent. The traditional difference between pitprop and pulpwood prices is consequently tending to lose its importance, particularly for the northern countries, and roundwood producers may be increasingly tempted to sell their timber as pulpwood.

Total available European sources of timber for pitprops and pulpwood will remain more or less unchanged so that any diversion of timber to pulpwood will generally be at the expense of pitprop production. In view of the emergence of Germany as a possible heavy importer of pulpwood and of pitprops, other importing countries may have to relax their specifications for softwood pitprops, or face the prospect of a diminished available supply. The situation will of course be quite different if additional pitprop supplies appear on the market from the U.S.S.R. or other sources, or if hardwoods or other substitutes are used for softwoods.

HARDWOOD PITPROPS

This question has received particular attention in France where special studies have been made. It is understood that the French coal mines in the North and Pas de Calais area at present use as much as 55 percent hardwood pitprops; in the middle and south of France the proportion used is about 10 percent. In the past, France was practically self-supporting with respect to pitprops but now must import quantities estimated at from 300,000 to 500,000 $m^3(r)$ yearly.

In spite of the successful use of hardwood pitprops in France, other countries do not seem enthusiastic in investigating the use of these pitprops in their mines. In some countries, particularly the Netherlands, the coal mines are strongly opposed to them. The future of hardwood pitprops is therefore uncertain and depends on the availability of softwood pitprops. Proper publicity regarding the safe use of hardwood pitprops, as well as purely economic reasons, such as their lower price, may, however, stimulate demand.

Steel Pitprops

Durable steel pitprops although not very popular with miners, became of added interest in many countries as the prices of pitprops increased during the postwar years (prices have nearly doubled since 1945). Steel pitprops are relatively expensive, but the high recovery percentage makes them more economical in the long run. (In France the price of steel pitprops at about 6,000 francs apiece is equivalent to about one cubic meter of pitprops.) Even though steel pitprops are being used in increasing quantities in certain countries, the general feeling in the coal-producing countries is that this will not affect the general pitprop situation to any great extent. In fact in some countries the trend is now to substitute wood pitprops for steel pitprops, since wood pitprops are at the moment in more ample supply while steel is scarce and needed for manufactured products, mainly destined for export.

1949 Export Availabilities

Finland and Sweden

Estimates made available to the ECE Timber Committee indicate that pitprop exports in 1949 are expected to amount to 1,100,000 $m^3(r)$ from Finland and 688,000 $m^3(r)$ from Sweden.

Exports from Finland will probably reach the export goals even though the picture presented to the ECE Timber Committee in December 1948 did not seem so favorable. One million cubic meters of pitprops have been contracted for 1949 shipments, divided among the United Kingdom (500,000), France (100,000), Turkey (100,000), Belgium (180,000) and the Netherlands (90,000).

Swedish pitprop export availabilities in 1949 have increased considerably over 1948 exports of 195,000 $m^3(r)$, and contracts have already been reported for 648,000 $m^3(r)$ for 1949 delivery. The major share, 534,000 $m^3(r)$, has been contracted by the United Kingdom with considerably smaller contracts for France and the Netherlands. It is believed that the sudden availability of pitprops is the result of the present unstable conditions on the Swedish pulp market as many wood pulp mills have reduced their pulpwood purchases.

Norway

Export availabilities for 1949 are 80,000 $m^3(r)$. This amount may be increased as it is possible that the 1948/49 felling targets will be exceeded.

Germany (excluding the Saar)

A considerable portion of the pitprop requirements is obtained within the separate zones or by inter-zonal trade. The French zone is expected to supply 240,000 $m^3(r)$ to the Bizone. There are no definitive figures concerning the U.S.S.R. zone; however, the Bizone and Poland may each receive 100,000 $m^3(r)$ from this source. The Saar may receive 570,000 $m^3(r)$ and France 200,000 $m^3(r)$ from the French zone. Bizone exports were discontinued at the end of 1948.

Table 4.—Pitprop Exports and Export Availabilities 1947-1950

Country	1947	1948	1949	1950
	(...	... 1,000 m^3 (r)	)	
Austria	43	62	60	60
Czechoslovakia	33	[1]140	[2]150	[2]150
Finland	1,610	1,278	1,100	900
France	[1]157	144	[3]100	100
Germany:				
Bizone	553	79	—	
French Zone	427	539	1,010	1,010
Soviet Zone	830	369	[2]750	[2]750
U.S.S.R.	93	38		
Ireland	—	...	9	9
Luxembourg	40	75	60	40
Norway	96	78	80	80
Portugal	122	160	125	125
Sweden	194	195	688	400
Switzerland	9	14	5	5
Yugoslavia	—	61	185	185
Other countries	11	21	.	
Canada	870	958	700	800
Total	5,088	4,111	5,022	4,614

Source: FAO/ECE Timber Committee.
—None.
... Not available.
[1]Figures of the ECE Coal Committee for receipts for coal and other mines from abroad.
[2]Estimated.
[3]Excluding 100,000 $m^3(r)$ carry-over from 1948.

France

Export availabilities for the United Kingdom in 1949 are reported to be 150,000 $m^3(r)$. This represents traditional export from the Landes. There is also a traditional export of small quantities of pitprops to Belgium and to the Netherlands from the French border districts.

Central Europe

Yugoslavia may have available for export 185,000 $m^3(r)$ and Austria 60,000 $m^3(r)$. Exports from Yugoslavia will probably be directed primarily to the United Kingdom and Austrian exports to Czechoslovakia. While no specific information is available concerning Czechoslovakia, the possibility of its entrance into the export market cannot be disregarded.

Portugal

Export availabilities estimated at 200,000 $m^3(r)$ will be directed to the United Kingdom, French North Africa, Italy, Spain, and Spanish Morocco.

U.S.S.R.

There have not been any large-scale exports during the postwar years. In 1949, exports to the Netherlands are expected to be 60,000 $m^3(r)$ and to the United Kingdom 150,000 $m^3(r)$. These quantities may be increased. Exports in 1949 from the U.S.S.R. and the U.S.S.R. zone of Germany were estimated by the ECE Timber Committee at 750,000 $m^3(r)$, of which 450,000 $m^3(r)$ were expected to go to Poland.

Canada

Contracts for shipments of pitprops to the United Kingdom in 1949 are reported to be 644,000 $m^3(r)$, whereas Canadian export availabilities for 1949 have been estimated at from 700,000 to 825,000 m^3 (r).

The Work of FAO

Latin-American Forestry and Forest Products Commission

THE first session of the Latin-American Forestry and Forest Products Commission was held at Rio de Janeiro from 23 to 30 May 1949. The meeting was attended by delegates from Brazil, Colombia, France, Nicaragua, Paraguay, Peru, Uruguay, the United States of America, and Venezuela; and by representatives from the United Nations Economic Commission for Latin America (ECLA), the International Labour Organisation (ILO), the International Refugee Organization (IRO), and FAO's Technical Committee on Unexploited Forests. Mr. Sebastian Anibal Romero, Forestry Director, Ministry of Agriculture, Venezuela, was elected Chairman of the session, and Mr. Julio Cesar Lafitte, Chief, Forestry Division, National Administration, Uruguay, was chosen as Vice-Chairman. The Chief of the Forest Products Branch of the Division of Forestry and Forest Products, Mr. Egon Glesinger, represented FAO's Director-General, and the Secretariat was furnished by the FAO Latin American Forestry and Forest Products Working Group.

The discussions at this first session were conducted on a high technical level, much important work was achieved, and the delegates were unanimous in asking for an early second session, if possible before the end of 1949.

The main item on the agenda was a report prepared by FAO on the Utilization of the Forest Resources of Latin America and on Equipment Requirements. After a thorough consideration of this report, the Commission recommended that it be submitted to the second session of ECLA, which was meeting concurrently in Havana. (The ECLA resolution on the report appears at the end of this article.)

The creation of a central Latin-American Research and Training Institute was recommended by the 1948 Teresopolis Conference. The Commission studied the possibilities of this idea in detail and agreed that this Institute and five regional stations serving particular areas of Latin America should be established within a period of three years. FAO will immediately draft a budget for the establishment, construction, and functioning of the Institute in the light of various official offers made to the Commission in respect to sites, facilities, and financial support.

Other points considered at length by the Commission and dealt with in the Report of the session were measures to be adopted to improve the compilation of forestry and forest products statistics; procedure to be followed in the standardization of the nomenclature of commercial timber and in initiating studies into the standardization of grades and sizes of softwood and hardwood timber in international trade; participation of Latin-American countries in the Conference on soil conservation and utilization in tropical and subtropical countries, now being organized by FAO for 1950; and the means of rapidly filling the need for qualified technical personnel in Latin-American countries, particularly through the employment of displaced persons from Europe.

The Commission recognized that the program of work required for Latin America placed an almost impossible load on FAO's Forestry and Forest Products office for Latin America, thus making it necessary either for FAO to increase its staff or for governments to depute technicians to collaborate with the existing staff for specified periods of time.

The first session of the Commission concluded with a vote of thanks to the Brazilian government for its generous hospitality in Rio de Janeiro. The report on the Utilization of Latin-American Forest Resources was then transmitted to Havana. Owing to its special significance, the speech with which this report was presented to ECLA is reproduced here in full.

Presentation of Report to ECLA

The spokesman for the Commission pointed out to the ECLA delegates that some 42 percent of Latin America's land surface is covered with forests — more than twice the area occupied by farmland including pastures. These 850 million hectares represent almost one-quarter of the world's forest area and give Latin America a higher percentage of forest land than any other continent.

"These figures would lead to the expectation that Latin America was one of the larger producers of forest products. This is not the case.

"Annual cut is estimated at about 170 million cubic meters but 93 percent of this is fuelwood. The present annual output of industrial wood is barely 15 million cubic meters, in other words, approximately the annual production of metropolitan France. Consumption of industrial wood annually is estimated at 80 kilograms per person, compared to 1,300 for North America and 300 for Europe. Even to meet these exceptionally low requirements, Latin America as a whole is a heavy importer of woodpulp and softwood lumber, and must be classified at present as a region with a net trade deficit in forest products.

"There are many technical and economic reasons for this paradoxical situation, but none of them provides any justification for its continuance. Through the application of modern techniques, it should be possible within the next generation to make Latin America one of the large suppliers of forest products to the rest of the world, raise consumption standards to the level of other regions, and create forest industries which would be a major source of wealth and employment to most countries of this region.

"In this connection it is important to dispel a frequent misunderstanding. It is often said that nothing is lost by leaving Latin-American forests untouched, because they constitute a valuable reserve for future generations. A virgin forest is not a gainful asset, because each year as much wood is destroyed as is added by new growth. Properly managed, a forest is capable of producing from 1 to 5 tons of raw material per hectare, and even 20 tons under especially favorable conditions, such as are found in parts of Chile and Brazil. The opening up of forests by cutting virgin stands and regenerating new forests is particularly important in Latin America because such management would result in improving the composition of the growing stock and adapting the timber to the requirements of modern forest industries. Early development on a large scale does not destroy a valuable reserve but transforms valueless areas of land into important economic assets.

"It is the program of FAO to assist governments in carrying out this development. To that end a Forestry and Forest Products Conference was held last year at Teresopolis; last February a Latin-American office for Forestry and Forest Products was installed in Rio de Janeiro, and two weeks ago the Latin-American Forestry and Forest Products Commission held its first session and adopted a report on capital and equipment needs for the development of Latin American forests.

"The original objective of this report was the determination of the needs of Latin-American countries for forestry equipment, especially as a corollary to a similar report on agricultural requisites, since frequently the same tractors, for instance, can be used in forestry and farming. Our Latin-American office has been in touch with all countries and has received from several of them a list of requirements. But in making this investigation, it was found that equipment was not the real bottleneck, because before it is needed there must be an industry capable of using modern equipment. To date, such an industry can be found only in isolated instances and—compared to the importance of the region—on a relatively small scale.

"The report has therefore attempted to estimate capital needs likely to arise

from the systematic development of modern forest industries in the various countries. The figures given both for the short- and the long-term needs must be regarded as very tentative and incomplete it will be FAO's task to improve them. Yet this first attempt to get to grips with Latin America's forest problem and the discussions during and after the first session of FAO's Latin-American Commission have produced a number of interesting conclusions.

"From a practical standpoint it is necessary to distinguish between two categories of forests, each of which offers widely different possibilities for industrial development.

"*Temperate and Subtropical Softwoods.* This is the wood which supplies 90 percent of the world's industrial needs. While very abundant in the Northern Hemisphere, it is relatively scarce among the natural forests south of the equator. However, in Brazil particularly a fairly large area of Paraná pine is found.

"This area of native softwoods is supplemented by large pine plantations, especially in Chile and Mexico, and since these forests mature in Latin America in 20 to 40 years, plantations could easily be extended.

"An industry already exists in the Paraná pine area. The present output of lumber and pulp is very small compared to the potential yield of the forests, even when potential yield is calculated on conservative estimates of growth capacity. The recently established pulpmills and plywood factories are modern, but lumber is produced in large numbers of small factories which, on the whole, produce low quality material with extremely high waste and thus also high cost.

"Here it should be possible to build in a short time an important forest industry. The attractiveness of this short-term proposition is not to be denied, even though it applies only to less than 10 percent of Latin America's total forest resources.

"*Tropical Woods.* By far the larger part of Latin-American forest resources is tropical and subtropical. This heterogeneous mixture of all kinds of woods has hitherto largely resisted industrial use. Mahogany, cedar, greenheart, and other precious woods have been extracted from tropical countries for centuries, but by taking only two or three trees per hectare and not bothering about the rest the forest has deteriorated and production costs have remained exorbitant.

"The problem is to convert to appropriate uses all the various kinds of timber occurring in tropical forests. On a laboratory scale this appears possible, and in West Africa plants are under construction or even in successful operation. But research and tests must precede the establishment of forest industries in the Amazon valley and other tropical forest areas of this continent.

"It is therefore proposed to set up as soon as possible one or two so-called 'forestry combinates' in tropical areas. Such a combinate is based on the principles of full utilization and systematic management of a fairly large forest area. This is achieved by setting up a variety of mutually complementary industries such as a pulpmill, a sawmill, a plywood mill, and possibly plants manufacturing a variety of chemical products. In this way the waste from one operation becomes raw material for the others, and yields, which in isolated industries are as low as 20 percent of the wood volume cut, can be raised to 60 or 80 percent.

"If this approach is successful, it will supply the key to open up one of the world's largest storehouses of renewable wealth, capable of supplying almost any kind of product, both for the domestic needs of Latin America's people and for export.

"These, then, are the technical possibilities. But to make them come true, more is needed, in particular: markets, capital, and industrial leadership and knowledge.

"There is no simple answer to these issues. But let us register a few important facts:

"1. There should be little concern about adequate markets even for a greatly expanded forest industry. All FAO estimates show a continued world shortage of lumber, particularly in Europe and the Far East. Unless the U.S.S.R. steps in very soon to fill the gap, some countries will have to curtail substantially their wood consumption, and lumber shortages may retard their economic development.

"The quantities of lumber likely to become available from an early development of Latin-American softwood resources are in the order of 100,000 to 200,000 standards a year. Since the European deficit after 1952 is estimated at around one million standards and a substantial although somewhat small figure looms in the Far East, there should be no trouble in selling all the additional output, provided it meets quality and price requirements.

"It should be remembered that outside Latin America there exist only two important sources for additional softwood lumber supplies: U.S.S.R., which is most uncertain; and North America, which means dollars. Added supplies from Latin America would therefore be most welcome in importing countries.

"2. Woodpulp is the most significant complement to rational lumber manufacture. The Preparatory Conference on World Pulp Problems, held in Montreal recently, brought out some very striking conclusions. In particular, estimates for 1955 indicate that Europe, which used to supply the pulp needs of all other regions except North America, will produce just enough to cover its own needs. Latin America might have to buy its pulp for dollars. But why import wood pulp, when all the factors to make it are at hand?

"3. Both for lumber and pulp, it seems well to anticipate a substantial rise in Latin-American consumption. At what rate that rise will come is open to argument. But with export markets available for lumber and pulp, there should not be much risk. And the same is true for other forest products, for which there are great needs in Latin America and most inadequate production.

"4. Substantial foreign capital might be needed to equip a modern forest industry. But it appears that lumber exports could easily pay for that.

"Assuming annual exports of 200,000 standards, the f.o.b. value would be around 35 million dollars annually, which could buy in five years more forestry equipment than even a rapidly expanding industry would use.

"5. A difficulty lies undoubtedly with industrial leadership and knowledge. Forest industries are not more difficult than others, but they require a certain industrial structure and considerable technical experience.

"Development corporations exist in most countries, but only in a few have they given attention to forest industries. The example of Chile, where a modern industry is about to be initiated through the Corporación de Fomento and with the help of the International Bank, is encouraging. If similar attention were given in other countries, we might get somewhere.

"And as for technical knowledge, the United Nations technical assistance program could help. Moreover, there exists today an unusual opportunity. Many specialists in forest management and industries are ready and anxious to leave Europe. They could do for forest industries in Latin America what the Huguenots did for German trade and industry 300 years ago.

"The problems I have touched upon are all of concern to FAO, for just as the Organization's interest lies in all aspects of agriculture — production, trade, and consumption; so with forestry and forest products, its interest is in forest industries and trade as well as in forest management.

"Forestry and agriculture cannot be separated. The development of virgin forests is as important to the agriculturist as to the forester; it is, in reality, a proposition that can frequently be classified as 'land settlement.'

"But these problems do not concern FAO alone. The development of forest industries also needs to be fitted into the broader framework of general economic development. The movement of capital that will result from the establishment of modern forest industries, the credits needed in that connection—both national and international—and the effect of forest products exports on Latin-American trade balances are clearly problems which can only be considered in connection with the broader problems entrusted to the Economic Commission for Latin America.

"These were the reasons that prompted the Latin-American Forestry and Forest Products Commission to urge FAO's Director-General to submit the report on the utilization of Latin-American forest resources to your present session, despite its preliminary character. In that connection, it was also anxious to draw your special attention to the following guiding principles:

"1. The report is to be considered as

a preliminary document only which is to be amended and completed by the secretariat and by governmental agencies before coming up for review at the second session of the Commission. In particular, it is to be supplemented by a study of equipment needs for reforestation and for the conservation of forests and soils. On the other hand, it should constitute a basis for the encouragement of the preparation of five- and ten-year plans for the development of forest resources and industries.

"2. In addition to these general qualifications, the Commission wishes to draw ECLA's attention to the following three basic principles:

"(a) The objective sought is not simply an increase in production but a modernization and diversification of forest industries. In particular, the aim must be to develop the manufacture of pulp and paper, fiberboards, and other products which at present have to be imported into Latin America.

"(b) In selecting sources for the procurement of equipment, the following order of priority is recommended: Latin America, soft currency countries, the dollar area.

"(c) The development of forest production should be accompanied by efforts toward the improvement of the quality of the products and of marketing methods, especially with regard to exports. This last action should be undertaken in co-operation with the FAO/ECE Timber Committee.

"3. The Commission decided to place on the agenda of its second session the problem of timber exports. It will endeavor to arrive at qualitative estimates regarding the possible exports of timber to other regions, in particular to Europe and the Far East, during 1950-51. It is desirable that delegates should arrive at the second session with information on these points.

"The report then is preliminary—but it shows that forest resources and industries are sufficiently important to Latin America's economy and development that they should not be overlooked. Their development is both a corollary to agricultural expansion and an important step on the path of industrialization.

"A second consideration worth remembering might be the close inter-relationship between various aspects of forest development and the general economic problems which are ECLA's concern. A similar situation has led to the organization of a most satisfactory working relationship between the Economic Commission for Europe and FAO. Problems in Latin America are different and call for somewhat different solutions. Yet co-operation is urgently needed.

"Finally, in order to go beyond generalities and administration aspects, there are two projects which seem ripe for immediate exploration.

"The first is the development of lumber exports to Europe and the establishment of industries for that purpose. Conversations with Brazil have already been initiated. Discussions with the International Bank and with ECE are planned. This might be pursued together, or at least ECLA should be kept informed.

"The second project, the establishment of forestry combinates, raises at least two urgent questions: Where should they be located? How should they be financed? This matter also calls for joint attention and should be explored without delay."

ECLA Resolution

After general debate on the subject, the following resolution was passed by the assembly:

The Economic Commission for Latin America

Considering that although Latin America's forests represent one fourth of the world's forest resources, their present contribution to the economics of the region and the world is negligible:

Considering further that the development of such resources based on modern industrial techniques and on the application of scientific forest management and systematic reforestation could substantially contribute to the welfare of the Latin American nations, facilitate the rationalization and expansion of agricultural production and constitute an important step toward the settlement of new lands and the creation of industrial employment in rural areas;

Takes note of the establishment by FAO of a Latin American Commission for Forestry and Forest Products serviced by a regional office with headquarters at Rio de Janeiro; and,

(1) Recommends that governments include in their economic programs the development of forest industries and the conservation of forest resources;

(2) Invites the Executive Secretary (a) to make arrangements with the Director-General of FAO in order to promote the development of the forest industries of Latin America through the combined efforts of both organizations; and, (b) to explore, through the studies on international trade which he is to undertake, practical measures for developing and fostering exports of forest products of Latin America to other parts of the world.

(3) Urges the international organizations concerned to carry out studies for the determination of suitable sites for the establishment of modern forest industries. Such studies should have the prior approval of the governments concerned and should take into consideration the domestic and foreign possibilities for financing.

Third International Poplar Congress

THE Third International Poplar Congress, organized to run concurrently with the third session of the International Poplar Commission, took place in Belgium and the Netherlands, between 18 and 28 April 1949, at the invitation of the Ministers of Agriculture and the National FAO Committee Chairmen of these two countries.

Representatives from Belgium, France, Italy, Hungary, Luxembourg, the Netherlands, Sweden, Switzerland, and the United Kingdom took part in the Congress. FAO and the International Union of Forest Research Organizations were also represented. The Congress and the meeting of the Commission were presided over by Mr. Ph. Guinier, the French delegate, who is Honorary Director of the National School of Waters and Forests. The vice-chairman was the Netherlands delegate Dr. Houtzagers, who is Professor at the Agronomic Institute of Waageningen.

Apart from official receptions given by the Ministers of Agriculture of Belgium and the Netherlands, the Congress consisted of a study tour and group discussions. The study tour took place in the poplar regions of these two countries, mainly in the Belgian provinces of the northeastern Ardennes and in the southern and central provinces of the Netherlands. The members of the Congress visited nurseries, natural regeneration centers, industrial plantations, agricultural estates, research institutes, match factories, clog factories, paper factories, and sawmills. The meetings took place at the Palais des Academies in Brussels, and at Eindhoven, in Holland. The questions discussed were the diseases and insect pests of the poplar, methods of culture, genetics, and wood tests.

The meetings of the International Poplar Commission itself were devoted to the work being carried out in different countries on genetics, to the poplar identification index, the index of wood tests, and to nomenclature of poplars.

This Congress, which was attended by senior members of forest administrations as well as by representatives of producers, scientists and technicians, and industrialists, was particularly successful, due to the excellent organization achieved by the Dutch and Belgian National Poplar Commissions. It was also, from an international point of view, a successful example of what FAO has always advocated collaboration between producers, technicians, and consumers.

New Program of Technical Assistance

At its June meeting in Paris the FAO Council closely studied proposals for increased technical assistance to underdeveloped countries, a subject which has attracted a great deal of attention since President Truman's inaugural address emphasizing the world's great need for a spread of technical knowledge.

The Council had before it a comprehensive report on Technical Assistance, an Expanded Cooperative Programme, prepared for the United Nations Economic and Social Council by the Secretary-General of the United Nations in association with the Directors-General of the United Nations specialized agencies.

Particular attention was given to that part of the report containing proposals made by FAO in its field of work. Some 57 types of projects in agriculture, forestry, fisheries, nutrition, rural welfare, and agricultural economics and statistics could be undertaken very soon, FAO proposed, should the technical assistance program go into effect.

Both the actual program and its costs would depend upon the degree of participation by beneficiary countries, which would themselves bear a considerable part of the cost.

Later, in August, the Economic and Social Council, meeting at Geneva, approved for submission to the General Assembly a comprehensive resolution on the organizational machinery, financial arrangements, and principles to be applied in launching the combined United Nations—specialized agencies program.

If approved by the General Assembly, a technical assistance conference will be called to determine the amount of contributions available for participating governments for execution of the program during its first year, and to give final consent to the proportionate shares of the total amount of contributions to be allotted to the various participating organizations.

The recommended plan provides two categories of disbursements from the special account to the participating organizations. The first 10 million dollars and 70 percent of the second 10 million dollars received would be automatically available for distribution to the organizations. The remaining 30 percent of the second 10 million dollars and all contributions above 20 million would be retained for subsequent allocations. FAO's proportion of the funds available automatically would be 29 percent.

News of the World

The items appearing here are condensed selections of news thought to be of interest to readers of Unasylva. *They are grouped alphabetically by countries under headings currently used by the Division of Forestry and Forest Products for reference purposes. The Editor will be glad to receive direct from readers authenticated items of interest and of news value for this part of the review.*

General

Union of Soviet Socialist Republics

• How to develop the commercial possibilities of the forests of the North Caucasus without endangering their protective character has been the object of a study by a special expedition of the U.S.S.R. Academy of Sciences. North Caucasus, also known as European Caucasus as distinct from Asian Trans Caucasia, is the neck of land lying between the Black and Azov Seas on the West and the Caspian Sea on the East. The main Caucasian Mountain Range forms its southern boundary. Except for the timbered foothills and slopes of the mountains, North Caucasus for the most part is a flat prairie country containing some of the richest agricultural land. It is densely populated and requires large quantities of forest products. Yet the forests of the North Caucasus have been supplying timber far below their potential capacity. Aside from their commercial possibilities, the forests of North Caucasus have also a high watershed protective value. The wooded regions of North Caucasus, and these include Krasnodar and Stavropol districts, the Chechen autonomous area, and the autonomous republics of North Ossetia and Kabardino-Balkarsk, have a total land area of 1,139,000 ha.; of these, 1,033,000 ha. are wooded. Overmature, mature, and nearly mature stands occupy 682,000 hectares comprising 203,000,000 m^3(r), exclusive of the forests designated as of local importance only. Although this represents less than one-half of one percent of the entire stand of timber of the U.S.S.R., its importance, because of its hydrographically strategic position as a regulator of stream flow and as a source of raw materials for rapidly growing industries in a surrounding treeless region, is out of proportion to its size.

The timber is distributed over the following areas:

	Million m^3(r)
Krasnodar	142.0
Chechen	22.9
North Ossetia	18.9
Kabardino	14.6
Stavropol	4.2
Total	202.6

Altitudinally there are three recognized forest zones: oak forests in the foothills at an elevation from 300 to 700 m., beech forests at elevations from 700 to 1,500 m., and fir forests at elevations from 1,200 to 2,200 m. Hornbeam, ash, maple, elm, birch, aspen, and alder occur as admixtures.

The North Caucasian forests are highly productive. Stands of the Caucasian fir (*Abies nordmanniana*), for instance, attain 1,000 m^3 and more per hectare,

and individual fir and spruce (*Picea orientalis*) attain a height of 62 and 57 m., a diameter of 185 to 190 cm., and an age of 700 and 400 years respectively. Beech stands run 400 $m^3(r)$ and more per hectare. The annual cut in 1946, however, formed only 31 percent of the annual growth. And this is a general occurrence. In the Krasnodar district alone there remain unutilized each year more than 2 million $m^3(r)$ at a time when the need for timber products in the region is very great. The reason lies in the lack of rational management of the forests, combined with damage sustained during the German occupation, difficult terrain for logging, and lack of large-scale mechanization of all forest operations.

• Increased consideration is being given to the forest resources of the Far Eastern parts of the country (the Maritime Province and the Khabarovsk region). Because of their vastness, and especially because of the great variety of species, these forests will be one of the great future sources of hardwood raw materials. The exploitable broadleaf forests of these regions constitute 24 percent of all such forests in the U.S.S.R. The main trees of these hardwood forests are species of birch, maple, basswood, aspen, walnut, oak, elm, ash, and such valuable species as the Amur cork tree (*Phellodendron amurense*) used exclusively as a substitute for imported cork during the war, and dimorphant (*Kalopanax pictum*), supplying veneers of exquisite pattern.

There are at least twelve recognized species of birch, and some of them because of their wide distribution have great commercial possibilities. They are the flat-leaved birch (*Betula platyphilla*), the Manchurian birch (*B. mandshurica*), the yellow birch (*B. costata*), and the black birch (*B. dahurica*). The flat-leaved birch accounts for 43.5 percent and the yellow birch 27.5 percent of the total amount of standing birch timber in Far Eastern U.S.S.R. (excluding Kamchatka and the coast of the Okhotsk Sea). There are seven species of maple, and two of them, *Acer mono* and *Acer mandshuricum*, attain large sizes. Two species of basswood (*Tilia amurensis* and *Tilia mandshurica*) are found and a number of species of aspen, the most important of which is the fragrant aspen (*Populus suaveolens*). The reserves of walnut (*Juglans mandshurica*) are not great.

The Mongolian oak (*Quercus mongolica*) is the most widely distributed broadleaf tree. Some 80 percent of the oak stands are found in the valley of the Ussuri River and on the coast of the Japanese Sea and 20 percent along the middle course of the Amur river. There are several species of elm but only two, *Ulmus propinqua* and the *U. laciniata*, are of commercial importance; the technical qualities of their wood are similar to those of the European elms. One of the most valuable hardwood species is the Manchurian ash (*Fraxinus mandshurica*). Most of it is found along the Ussuri river and the coast of the Japanese Sea.

With this great conglomeration of hardwood species, the Far Eastern areas may become the center of many industries depending on hardwoods, for example, the veneer industry, shipbuilding, furniture and vehicle construction industries, tannin extraction and the chemical industries based on hardwood distillation. All this, however, is still in the future. At present, only conifers are being cut for lumber; the hardwoods which account for 30 percent and more either remain uncut or are cut only for fuelwood. Although there are many streams suitable for floating loose logs, this is not feasible with loose hardwood logs, except birch. The sinkage is too great. They can be rafted, however, when made up together with pine logs.

Canada

• An Advisory Committee on Forest Products Research has been formed to work closely with the Forest Products Laboratory, Ottawa, in the investigation of methods of wood utilization. Members of the Committee, representing various branches of the forest products industry, will make their experience and advice available in regard to work being carried out at the Laboratory and they will suggest new lines of research in wood utilization. Small technical committees will be set up to co-operate with the Laboratory on research programs related to their specialized fields. The chairmen of these committees will be selected from industry, and the secretaries will be members of the Laboratory staff. The Wood Preservation Committee will be established first, and representatives of wood-using and wood preservation companies have been asked to name members to this group.

L. L. Brown, Vice-President and General Manager of the Canada Creosoting Company, was named chairman of the Advisory Committee at an Organization meeting held at the Laboratory and attended by representatives of the Canadian Lumbermen's Association, Maritime Lumber Bureau, Furniture Manufacturers' Association, Hardwood Veneer and Plywood Association, wood preserving companies, and the railroads.

Finland

• During the summer of 1948 a new method of disseminating knowledge and training in forestry was tried out in Northern Savo. The system proved very successful and will be applied this summer in the region operated by the Forestry Board of Central Finland. Its purpose is to teach silvicultural methods to young farmers and sons of forest owners, who are invited to attend special courses in forestry. During the courses, forest owners, both present and future, are taught to manage the farm forests in the most profitable way without being dependent in every respect on the assistance of professional foresters.

Japan

• This year, the traditional Arbor day which is celebrated in April was replaced for the first time by "Arbor Week" in order to intensify planting. The week starts with the "House tree" day when every family plants a young tree; the next day is the "Factory and Office tree" day; then there is the "Street tree" day when trees are planted by children in parks, yards, temples, and on roadsides; the "Forest tree" day; the "Railway Stations and Roads Tree" day; the "School Tree" day. The seventh day is dedicated to instruction in the care and protection of trees against diseases and insects. A number of propaganda meetings were scheduled for the same week. Japan hopes that this move will awaken the people's interest so as to assure the adequate reforestation of the 3 million hectares which were destroyed during the war.

Mexico

• The 1949 Annual Arbor Day has been successfully celebrated throughout the country with the participation of government officials and thousands of school children and students. Trees were planted in parks and along streets of cities and communities.

Norway

• Norway is the first member government to launch FAO's great 1950 World Census of Agriculture. Census workers of that country began on Monday, 20 June, to gather a mass of information which will give an accurate picture of Norway's agriculture, forestry, and fisheries.

The information thus gained will be used by FAO as part of a statistical report on world agriculture more comprehensive than has ever been attempted before.

The world census of agriculture is not confined to FAO's 58 member countries. It is hoped that all countries will participate. In that connection, the Bizone of Germany was actually the first area to take the census. On 22 May, 80,000 census workers set out to interview all farmers cultivating more than half a hectare of land.

Denmark, the French Zone in Germany, and Austria also plan to conduct the census in the present calendar year.

Silviculture and Management

Austria

• Austrian specialists have perfected a new tapping instrument, the Mazek plane, named for its inventor. It is a great improvement on the tool of German design which is used in America, Germany, and in other countries. The chief advantages consist in the conservation of the wood, which is scarcely affected by the tapping operation; a 30% to 50% increase of efficiency in the work; a prolongation in the duration of tapping by at least 25% due to the fact that it can be done yearly and give the same amount of sap; and a 30% reduction in the loss of turpentine. These planes are easily operated with one hand and can be used either on a smooth surface, according to the French and Portuguese method, or on a grooved surface according to the American method. The instrument can be automatically adjusted to make incisions at desired regular intervals and the depth can also be automatically regulated. The instrument is also coming into use in countries other than Austria.

Czechoslovakia

• The Institute of Forest Cultivation at the Agricultural Faculty in Prague has initiated a campaign for poplar planting which is important in several respects: (1) poplars will be planted to increase the volume of available timber within the shortest time; (2) planting poplars will be a means of utilizing unused land along rivers and streams covered with alluvial soil where the quickest growth can be obtained; (3) clumps of poplars will serve as windbreaks and protective forest strips, especially in lowlands; (4) the campaign will possess an important educational value: it constitutes a part of the scheme of planting all barren lands with forests. Because poplar grows fastest of all Czechoslovak tree varieties, young people will be able to see the results of their efforts; and find that fast-growing poplars can produce serviceable timber within a period of twenty to twenty-five years. Good results obtained in planting poplars will, within a few years, serve as an argument for planting other kinds of timber on barren land.

The greatest emphasis is being laid on planting poplars in lowlands; there it will be possible to grow these trees on larger stretches of land. Poplars will also be planted on hills up to an elevation of almost 610 meters (2,000 feet) above sea level. A special Act imposes and regulates the duty of registering all places suitable for planting poplars. A list of acclimatized mature poplars furnishing good breeding material will be made. On non-Government lands the campaign will be in the hands of the Forestry Bureaus of the District National Committees.

The year 1949 will see the preparation of the plans for the campaign. It is expected that 500,000 trees will be planted by 1951, after which one million trees would be planted annually. At the end of the Five-year Plan the majority of places suitable for growing poplars will have been planted with these trees.

Hungary

• One of the Forestry Departments of Hungary has set up a pine-seed separator plant with an investment of 10,000 forints, to provide pine seed for new plantations. The seed is selected from the cones, cleaned, and disinfected. The capacity of the plant is 15 quintals of pine seed, which is the requirement for the reforestation of 750 ha. (1,850 acres) of loose-sand soil. The cost of one kilogram of pine seed will be 20 forints, instead of the 50 forints per kilogram paid by foresters before.

Fundamental Science

United States of America

• One of the most disturbing problems facing Texan ranchers is that the vast rangelands of this region are being overrun by brush and cactus. Department of Agriculture economists believe that if mesquite could be eliminated from existing pastureland, production of beef would increase from 625.5 million pounds (283.7 million kilograms) per year to 993 million pounds (450 million kilograms). The growth of this brush is encouraged by climatic factors such as drought and severe winters, also by the burning of grasslands at the time when this region was first settled, and finally by the increase in the numbers of birds and small rodents which followed the settlement of the first ranges. Much more important, however, has been the effect of continuous overgrazing. On a thinned-out grass cover with soil packed down by the trampling of cattle, the seeds of the invading shrubs easily take root; a more favorable environment is provided for the growth of their roots as compared with the root system of graminaceous and herbaceous plants; the leaves and branches no longer have to overcome the competition of the thickly matted grass cover. Finally, the mesquite seeds are consumed by the cattle and their germination is stimulated by the action of their digestive juices.

Numerous investigations have been made to find the most effective means of combating this invading brush without bringing about soil deterioration or causing erosion damage. Although fire is sometimes used, this agent is more harmful than beneficial unless carefully controlled by experts. Mechanical eradication by means of bulldozers, brush cutters, or brush eradication machines especially designed for this difficult type of work has produced good results. However, such machinery is very expensive. For machines of the bulldozer type, the cost amounts to from $4 to $15 per acre, depending on the density of the infestation. Specialists on rangeland problems base their greatest hopes upon the use of chemicals and are experimenting with kerosene and fuel oils, ammonium sulfamate, sodium chlorate and zinc chloride, certain arsenic compounds, and, above all, compounds of hormone type 2,4-D and 2,4,5-T. The latter are highly selective in their action, are not damaging to grass and seem to be the most suitable eradication agents for use in the near future.

Union of Soviet Socialist Republics

• Afforestation or revegetation of desert moving sands is always a difficult task. For this reason, it is of interest to learn more of a plant, new to agriculture, which is to play an important role in stabilizing, within the next three years, some 100,000 hectares of shifting sands in the Soviet Union. The plant is the so-called Sorghum-Johnson Grass hybrid. It is a perennial plant developed by Professor Derzhavin by crossing cultivated Sorghum with a perennial wild cereal known as Johnson Grass. In natural state, the Johnson grass is a most obnoxious weed, exceptionally tenacious of the soil and resistant to extreme drought, heat, and cold. The hybrid thus obtained possesses the tenacity and resistance of the Johnson grass and almost the same fodder and nutritive qualities as the cultivated Sorghum. It was first planted ten years ago on 2 ha. of bare shifting sand. Two years late, the barren sands supported a thick green cover from two to three meters high. The Sorghum-Johnson Grass hybrid has now been cultivated successfully for several years on the arid sands of the North Caucasus. It withstood prolonged droughts and high temperatures and yielded 2.5 tons of hay per hectare at a time when the surrounding land lay bare and parched. In the course of the summer, the fields growing the Sorghum Johnson Grass hybrid can be mowed three or four times. This is the plant with which the U.S.S.R. hopes to convert many of the areas of shifting sands in the Volga region into productive hay fields and pastures.

Forest Protection

Canada

• The Petawawa Forest Experiment Station is particularly valuable to Canada because of the varied long-term research being conducted on over 500 plots scattered throughout the forest, which covers a tract of 92.6 square miles (240 km^2). Consequently, every effort has been made to insure as intensive a fire protection as possible in this forest. The objectives of the control plan include: the limitation to an average area of 10 acres (4 hectares) per year of any fire occurring in the forest; and the protection of the sample plots, experimental plantations, nurseries, and other areas specifically reserved for research purposes, so that no fire can endanger the continuity of this research work.

A booklet published by the Department of Mines and Resources of Canada gives details of the plan with regard to the fire control organization and the allotment of fire-fighting staff in proportion to the fire risk; methods of fire prevention, detection, and suppression; the organization of communications, transportation facilities, and the training of a fire-fighting force. Although the aim is to achieve a degree of protection which can only rarely be expected in forests subject to the usual fire hazards, this plan is a valuable model for study by technicians dealing with problems of this nature.

Cyprus

• Some further elucidation is necessary in connection with the news item on Cyprus which appeared in Unasylva, Vol. II, No. 6, page 340. The Acting Conservator of Forests of the Cyprus Forest Department pointed out that the reports reviewed in that news item give the normal forest increment as 14.15 thousand cubic feet, true measure under bark, converted to 7 cubic feet per donum (⅓ acre) per annum, or 21 cubic feet per acre, 1.47 m^3(r) per ha. FAO gave the normal forest increment as 1.4 m^3 per hectare or 20 cubic feet per acre.

There are also several references in the reports to the Goats Law but no definition or general description is given. Briefly, the Goats Law is a law under the statute laws of Cyprus not included under the Forest Law. Under this Law a village may request the administration to hold a ballot to decide whether Free Range Goats shall be excluded from the village lands. If a majority favors the exclusion,

then the village lands become prescribed lands under the Goats Law. Then straight penalties can be applied to prevent goat grazing which becomes an offense regardless of whether or not damage is proved. The direct importance and intention of the law is to enable wine, olive, and carob growers (to mention the three commonest tree crops concerned) to be protected from the crippling and almost prohibitive losses caused by goats. Indirectly, the Law provides a means of sealing off forest areas, from which grazing has been eliminated by the methods described in the reports under review; since, if all the villages adjoining the forest ballot and apply this law, these becoming prescribed villages, no goats can pass through these lands to enter the forest. The general principles of the Law in question might be applied anywhere, and it might be of value in any territory where grazing was traditionally unrestricted, as in Cyprus, either by law, custom, or enclosures, to the detriment of progress in either agriculture or forestry.

Most of the pasture rights are individual, few rights are communal or vested in corporate bodies, e.g., monasteries; and the question of moving villages isolated within the forest applies only to the forests of the Southern Range, as the Northern Range forests consist of a narrow belt containing no permanent settlements.

Conversion

United Kingdom

• The results of 16 years of tests on the preservation of mine timbers are described in a report "Experiments on the Preservation of Mine Timber" published by the Department of Scientific and Industrial Research, Forest Products Research Records No. 3. A considerable increase in the life of timber can be obtained by a simple preservative treatment. The tests described were started in 1930 on untreated and preserved pitprops to demonstrate the practical value and economy of preserving mine timbers. For this reason the treatments were carried out at two collieries using a simple open tank method for impregnating the props with coal tar creosote and a few water soluble type preservatives. Where conditions are favorable to decay such treatment can make for an increase in safety, a reduction in maintenance costs, and a substantial saving in the volume of timber used for props, bars, and other supporting members in permanent or semi-permanent roadways, ventilation doors, rail sleepers, shaft timbers and linings, and for tubs or trams where these are made of wood.

Economics and Statistics

Argentina

• Construction of a new plywood plant will begin shortly at Neuquen, near Lake Moquehue, not far from the Chilean border. Compania Argentina de Industrias Forestales, S.A., acquired 3,000 hectares of "pehuén" (*Araucaria araucana*) at public auction from the Government at 36 Argentine pesos per cubic meter of standing timber. The new plant will have a minimum annual capacity of 3,500 m^3 and will employ approximately 500 workers.

Finland

• Government restrictions on exports of roundwood have been abrogated. Permits by the State License Board are no longer required.

• In recent years Finland has been a major exporter of prefabricated wooden houses; about 90 to 95 percent of the output was shipped abroad. Lately, however, Canadian and Swedish competition in foreign markets has become considerable, and certain other European countries are also trying to stimulate the export of prefabricated houses.

The Finnish industries have therefore been looking for new outlets. Negotiations to increase purchases of Finnish wooden houses have been carried on with a number of non-European countries where the demand is comparatively keen. Simultaneously, output is to be expanded to meet domestic requirements to a greater extent than hitherto. It is expected that, because of new housing plans and price reductions, some 1,000 to 2,000 prefabricated wooden houses will be absorbed by the home market during the current year.

Portugal

• It is understood that exports to the United Kingdom of timber and cork have been secured in the discussions which have taken place in Lisbon between United Kingdom and Portuguese delegations on the course of trade and payments between the Portuguese monetary area and the sterling area during 1949.

Union of Soviet Socialist Republics

• In a report for 1948, the Ministry of the Timber and Paper Industries presents statistics, in percentages only, showing progress achieved in timber operations and in the output of forest products during the past year as compared to 1947. Specifically, 43.9 percent more wood was brought out of the forest in 1948 than in 1947, whereas the total amount of timber cut was 37.3 percent greater. The manufacture of paper increased 18.5 percent and that of cellulose 35.4 percent. Sawn lumber production increased by 55.1 percent, veneers by 34.8 percent; matches by 59.9 percent; hydrolyzed spirits by 65.4 percent; and the chemical wood industry expanded by 37.8 percent. The export of timber in 1948 was 7 percent greater than in 1940. Due to more rational timber utilization, 66.5 percent of the cut appeared as saw log material against 55.5 percent in 1940, and in 1948 there was 47 percent more saw log material available to the country than in 1947.

United States of America

• In 1898 when all railroad ties were untreated, 304 ties for each of the 264,684 miles (489 ties for each of the 425,968 km.) of railroad track then existing in the United States and Canada had to be replaced annually. In 1947, owing to preservation treatment, only 117 ties for each of the 379,066 miles (188 ties for each of the 610,049 km.) of track in operation had to be replaced. Assuming an average cost in place of $2.90 for an untreated tie and $4.00 for a treated tie, this represents an annual saving of over $156,000,000.

Policy, Legislation, and Administration

Colombia

• By a recent legislative decree the Instituto de Parcelaciones, Colonizacion y Defensa Forestal (Institute of Land Division, Colonization, and Forest Defense), has been created. This should be an important step towards the protection and development of the forest resources of the country. The Institute is a self-governing body, and, with capital of nearly $5,000,000 (U.S.) at its disposal, it is expected to carry out an extensive program. Among its objectives are: forest inventory and mapping; modern exploitation of timber and other forest products, such as rubber, resins, cinchona bark, fibers, etc.; government aid in reforestation work through technical assistance and credit facilities to planters; establishment of tree nurseries and tree farms; reforestation of watersheds and eroded soils. The Institute will also undertake to regulate distribution of forest products from the producing regions to shipping centers for local consumption and export.

United States of America

• The success of the so-called "extension forestry services" among small woodlot owners is well-known. Such services are differently organized in the various states, but it would be of interest to take as an example the New Hampshire State Organization, which has functioned since 1945.

New Hampshire has eight county foresters, each of whom has one, or sometimes two, counties within his district; the county foresters are under the direction of the "extension" forester. The extension service program is financed jointly by federal, state, and county funds.

Each county forester prepares a work plan for the coming year, to be submitted to a County Forestry Committee composed of representative woodland owners of the county. After consideration has been given to suggestions in the revision of the plan, it is submitted for approval by the extension forester. The County Forestry Committees and the State Forestry Committee, on which the latter are represented, are kept informed as to the implementation of the work plans and participate actively therein.

Essentially, the work programs are focused on the education of forest owners. The furnishing of material services, such as the marking of trees for cutting

and selling, is done primarily with a view to the educational value of the demonstration given. Moreover, every effort is made to attract to such demonstrations the greatest possible number of woodland owners in the vicinity, who become as many potential future co-operators. It is in this spirit that 600 demonstration lots have been set aside in privately owned woodlands during the past three years. These lots are distributed throughout the state and cover more than 10,000 acres (4,000 ha.), making it possible to attract the attention of all woodland owners and stimulate their interest in proper management practices.

Aside from the direct, on-the-spot demonstration method, the county foresters attempt to reach forest owners by publishing articles in the local press, sponsoring radio talks or lectures, displaying posters, holding expositions and organizing contests for which prizes are distributed. In so doing, stress is laid on the financial benefits derived by the winners of the contest from the rational exploitation of their forest lands.

Close co-operation with the Soil Conservation Service and the Production and Marketing Administration is maintained. On the other hand, should a forest owner desire the regular services of a qualified forestry technician, either for specific forestry services or for management operations, the county foresters provide names of private consulting foresters or forestry companies offering this type of service.

• In 1948, through the agency of the "soil conservation districts," soil conservation methods were applied to 344,827 farms averaging in size 290 acres (117 ha.) each. According to statistics of the Department of Agriculture, each farm paid an average of $103 additional income tax during the same year, making a taxation increase of $35,517,181 which can be attributed directly to the application of soil conservation measures. Furthermore, the increased production of these farms led to an increased volume of trade by wholesalers and retailers, which in turn caused them to pay additional taxes, estimated at $33,575,000. Since the total expenditures for the Soil Conservation Service amounted to $39,189,654, it appears that not only were these expenditures recovered in their entirety in the form of taxes, but in addition the Federal Government made a profit of 76 percent on funds used for this purpose.

Personalities

• Raphael Zon, Fellow, Society of American Foresters, and former Director of the Lake States Forest Experiment Station, Forest Service, U. S. Department of Agriculture, has been appointed Honorary President of the Seventh International Botanical Congress which is to be held in Stockholm, Sweden, in 1950.

• Edwin C. Jahn, international authority on cellulose, has been named the first Director of Research at the New York State College of Forestry at Syracuse University. The new position was established by the College because of the rapid growth in research at the college during recent years. Successful pulping of hardwood is one of the major research projects which now come under Dr. Jahn's direction. Other projects include improved manufacture of plywood by electronic heating, decay resistance and prevention in wood, regeneration of abandoned land through intensive forest management, and wildlife pathology and propagation.

• At the end of March 1949 the President of Mexico appointed Eulogio de la Garza as Director General Forestal y de Caza (Director-General of Forests and Game). Mr. de la Garza graduated from the Forest School of Coyoacan and the School of Agriculture of Chapingo. During his long career in government service he has acted in many public positions as professor, technician, and adviser.

Meetings

• The First Convention of the Pine Lumber Producers of Mexico was held at Durango, Mexico, from 9 to 11 December 1948. Papers and discussions were presented on the following subjects: forest conservation and protection; modernization of the lumber industry; organization of a producers' association; standardization of grades, marketing, and distribution; and co-operation with government authorities for the adoption of a forest policy. The Convention adopted many resolutions and recommendations which undoubtedly will bring benefits for the industry and closer cooperation with the government in its plans for forest protection and conservation.

Reviews

Our Conservation Job. Stephen Raushenbush. Pp. 64. The Public Affairs Institute, Washington, D. C. March 1949. 50 cents.

A remarkable analysis of the factors prevalent in the United States which impede the application of a sufficiently vigorous policy of soil, forest, and rangeland conservation, as well as of an economic policy to protect irreplaceable natural resources, appears in a booklet by Stephen Raushenbush published under the auspices of the Public Affairs Institute. The book also suggests a solution for this problem which will be proposed to Congress for study in the near future.

The ideas discussed deserve the attention not only of conservation specialists in the United States and throughout the world, but also of any persons who have any degree of responsibility whatsoever in this connection, as well as of the general public, which is directly concerned.

Mr. Raushenbush indicates three reasons for the comparative failure of our present conservation programs.

First, the sense of public responsibility among owners, and particularly among farmers, is inadequately developed. Second, the private means available to a landowner for financing a soil conservation and rehabilitation program or a forest restoration program are absolutely inadequate in comparison with the purposes to be achieved. Capital invested in such a program requires the payment of an annual interest rate of from 4 to 6 percent, plus an annual amortization rarely distributed over a period of more than 20 years. But in this field many years may elapse before the landowner derives any benefit from his work, such as, for example, an increase in harvest yield; furthermore, the slightest fluctuation in agricultural prices may place the farmer in a position where he is absolutely unable to make regular payments on the large sums which he owes.

Finally, the normal system of bank credits is ineffectual for long-term conservation projects, and efforts to remedy this situation have been totally insufficient so far. Annual appropriations by Congress likewise are not well adapted to long-term projects. No private individual would think of building a house or even of carrying out major home repairs by deducting the necessary capital from his annual income; yet this is what has been done up to now in the field of conservation.

The capital investment costs involved for the entire United States are roughly estimated as follows:

$11,100 million for soil protection and increased production programs covering 405 million acres (164 million hectares);

$3,775 million for afforestation, reforestation, forest management, and the construction of access roads on 251 million acres (102 million hectares) of land;

$215 million for the integration of wood industries and the acquisition of new national forestlands covering 19.1 million acres (7.7 million hectares), particularly in the Redwoods region; and

$250 million for the improvement of rangelands covering 60 million acres (24 million hectares).

It is proposed that, after these projects

have been individually examined and certified by the various federal services concerned, they should be financed by a government credit organization called the National Resources Corporation (NRC).

Such an agency would issue bonds at interest rates varying from 3 percent to a maximum of 5.5 percent (the minimum interest being guaranteed by the Federal Treasury) up to the amount of $13 billion, at the rate of $1-2 billion a year in times of normal business activity and with an amortization term varying between 20 and 60 years. A loan of $900 million, to be repaid later, would be advanced by the Treasury to the National Resources Corporation to cover the first interest payments.

NRC loans would be made upon condition that the borrower would promise to execute a previously formulated conservation plan not only upon those lands for which the loan was made, but also upon adjoining properties belonging to him. Such a program would have to be pursued continuously for the entire period during which such loans were outstanding. The loans would carry a 2.5 percent rate of interest for forestlands and a 3.5 percent interest for soil conservation projects and the increasing of production. Furthermore, variable payment provisions would be allowed for interest or mortgage payments, including a moratorium at the start covering a maximum 5-year period for the conservation and improvement of existing soils or forests and a 15-year period for afforestation work.

Furthermore, the borrower would undertake to share with the lender any additional profits obtained from a rise in agricultural prices during the time the loans are outstanding at the rate of 60 percent for himself and 40 percent for the bondholders.

Finally, special provisions would eliminate competition with private banks, guarantee tenant farmers against loss of capital invested in conservation projects for the period during which they hold leases, and make possible the inclusion of public forestlands and rangelands under the benefits of loans granted by the National Resources Corporation.

Such are the main points of the solution proposed by Mr. Raushenbush, a solution which appears perfectly reasonable and practicable. It is to be hoped that this proposal will be followed by the application of such a program: the stakes involved are very high, both for the United States and for the rest of the world.

The Economic Problems of Forestry of the Appalachian Region. William A. Duerr. Pp. x + 317. Harvard University Press. 1949. $5.00.

The Appalachian Region includes five states—Kentucky, North Carolina, Tennessee, Virginia and West Virginia, with a total area of nearly 125 million acres of land, of which 51 percent is classed as forest and 23 percent as cropland. There are several provinces—Coastal Plain, Piedmont, Highlands, Great Valley and Interior—each with its own physiography, cultural pattern, forests, agriculture, etc. About 69 percent of the population of nearly 14 millions is rural.

Most of the region has been long settled. "Contrasts and diversity characterize nearly every phase of the region's life. Its culture varies from the decadent rural feudalism of some of the old agricultural areas to the brash, adolescent industrialism of the Carolina piedmont or the Kanawha valley—both of them in contrast to the frontier culture of the highlands. Racially, also, great differences are to be found: the high proportion of Negroes in tidewater and in the Mississippi valley; the Anglo-Saxon stock of eastern Kentucky; the southern and southeastern European element of the mining areas; the mixed groups of the urban centers. Essentially rural and agricultural, the region nevertheless contains some of the most important bituminous coal-mining areas in the nation and is a leader in several types of urban industry. Great industrial centers like the northern panhandle of West Virginia contrast with areas of highly decentralized industry like the piedmont. In agriculture, there are the subsidized latifundia and the prosperous commercial farms of central Kentucky and Tennessee on the one hand; the tiny, impoverished subsistence units of the highlands on the other. In forestry, there are wide areas of nearly continuous timber in industrial and public ownership; other areas nearly devoid of trees; and still other areas, as in the west, where the forest consists largely of farm woodlands. In the east is a great pine belt; the center and west are predominantly hardwood areas. The subtropical longleaf pine grows in southeastern North Carolina; the subalpine spruce and fir on the summits of the Blue Ridge and Alleghenies."

The author sets up a schematic outline of the subject matter of the economics of forestry, as applied to forest land, forest production, forest industry, distribution and prices of forest products and consumption of forest products. Most of the book then identifies and describes the economic problems of land and people, of forest land management, of timber management, of marketing generally and with respect to various forest products, and of consumption of forest products in the provinces and the region.

Problems are many and severe; they concern maladjusted agriculture, forest economy, coal mining areas, instability in use of land, a multitude of small holdings of forest land, tax delinquency and many others. Better use of forest land is clearly a major element in working out a more satisfactory economy in the region and its role in the whole rural economy is emphasized. Many earlier specialized publications dealing with aspects of the region are drawn on in the economic analysis.

But the prime aim is to define the field of the economics of foresty and to outline the economic problems of forestry as background for further research in this complex region, with the hope that the method and approach may be useful elsewhere. The book, with its deliberately limited objectives is useful in emphasizing the vast amount of work still needed, both in research and in action, to restore forest resources to their potential might in the economy of a deteriorated region. Even though the schematic outline of economic problems may not fit other areas and regions, it is to be hoped that the general pattern may be used elsewhere. The effort to see a region as a whole, to synthesize its separate problems, can hardly fail to stimulate comprehensive rather than fractionalized attention to great and complex forest problems. Such over-all attention is a challenge to the best brains that can be brought to bear on the whole economic problem of regions in which forests are or may be important.

Erfarenheter om anvandningen av motorsaga (Experiences with Power-Saw Felling.) Pp. 190. Föreningen Skogsarbetens och Kungl. Domänstyrelsens Arbetsstudieavdelning. In Swedish with English summaries.

The Job Study Department of the Forest Employers' Association and the Swedish Forest Service (Föreningen Skogsarbetens och Kungl. Domänstyrelsens Arbetsstudieavdelning, abbreviated S. D. A.), has, since January 1946, carried on time studies on power-saw felling to analyze the effect of timber dimensions and density of selected trees upon the work output, and to find a basis for calculations concerning the organization and improved efficiency of the work. Part of the results, primarily those of investigations and the experience gained in the use of the two-man power-saw have been recently published.

The first article, "Power-Saws—Their Possibilities in Swedish Forestry," by G. Carpelan, deals with the history of power-saws and with Swedish experiences with two-man power-chain saws of the so-called sword type. Comparison of time expenditure between power-saw and manual felling under similar conditions shows that the diameter limit above which power-saw felling proves its time-saving worth generally varies between 20 and 30 cm. (8 and 12 inches) b.h.d., over bark. On the other hand, it has been stated that, since it is not possible to operate with power-saws for as long a time in any one day as when the felling is carried out by hand, the lack of efficiency results in a loss of time, which, calculated in percentages, is the same for different dimensions. The diameter limit above which power-saw felling has turned out to be economical, under certain conditions, approximates 33 to 41 cm. (13 to 16 inches), depending upon the intensity of the sawyer's working day. The construction of some of the power-saws makes it possible to reduce considerably the height of tree stumps, thus decreasing the economic diameter limit. After having dealt with the most appropriate methods of organizing the power-saw felling work, the author of the article comes to the conclusion that, as the chain saws are very sensitive to variations in economic conditions governing their use, they cannot be regarded as the final type of felling machine most suited to Swedish conditions.

The author of the other article, K. G. Zimmerman, deals with the organization of power saw felling based on experiences of two-man chain-saw logging in Central Sweden. He also concludes that, under certain conditions, two-man power-saw felling can be considered as economically sound provided circumstances permit a reduction of losses by leaving lower stumps than with manual saws. He agrees with the author of the first article, on the difficulties of using two-man power-saws in deep snow.

S. D. A. has recently started to investigate the use of one-man power-saws as well as the most suitable organization for working them under Swedish conditions, and hopes to be able to publish an analysis of the results in the near future.

History of the White Pine Industry in Minnesota. Agnes M. Larson. Pp. vii + 432. University of Minnesota Press. 1949. $7.50.

This book is first of all a careful and detailed documentary. The white pine industry, beginning in 1839 with a single sawmill, which cut 5,000 board feet a day in a forest of 38 million acres (70 percent of the State area), rose and expanded to a peak of production about 1907, then dwindled as region after region was cut out, mills were closed, and communities faded. So this industry ran its course.

Logging methods changed during this spectacular if brief history—ever toward greater and more rapid exploitation. Chopping with the axe gave way to sawing; skidding by oxen direct to water or rail head was replaced by vast sled-loads of logs hauled over iced roads for long distances; local sawmills developed into great Mississippi river manufacturing centers, served by a multitude of spring drives to concentration booms from where huge rafts of logs and lumber were first floated and later towed as far as 800 miles to lumber-hungry St. Louis; tiny muley mills gave way first to circular and later to band and gangsaw mills capable of ¾ million board feet a day; railroads expanded the distribution of white pine and speeded up logging; logging camp organization changed from the small groups of the early shanty boys living and working with the most primitive bare necessities to the big well-organized camp of later days. All of these make lumbering history and here is a source book about them.

The explosive expansion of the industry was made possible by taking from the Indians by one means or another the pineries to which their title had been earlier confirmed; by loosely liberal land laws, benignly administered, under which great concentrations of timberland were made honestly or otherwise by energetic and daring men, little concerned for the future.

In the second place the book appraises the results of the rapid and uncontrolled exploitation of a great forest. In Minnesota itself the lumber industry stimulated the development of farming because of needs for food in order to expand lumber production; the industry resulted in formation of capital for investment in the State and in the great undeveloped farming areas to the west and south; railroad building was hastened to move lumber to multiplying prairie farms; some good, but more poor land was cleared for farming; jobs for the mounting wave of immigrants were provided, and these stimulated population growth.

Elsewhere the development of the great farm areas of the middle west could hardly have proceeded so rapidly without the abundant supply of lumber; the use of the Mississippi as a water highway for lumber and logs speeded development of cities on its bank.

On the debit side the great northwoods were reduced to huge areas of waste or understocked forests, mostly unsuited for farming; only remnants of good forest, belatedly placed in public forest reservations, remain to show what might have been if the idea and practices of forest conservation had been in existence early in the exploitation process instead of at its end, when the horse was out of the barn. Tax delinquent lands, impoverished local governments, abandoned towns and industries were part of the price.

The book is a good job of regional writing, interesting and worthwhile on its own account. But it has a greater significance as well, for the lesson that shows through the mass of careful detail is what can happen to a great forest estate when there are no effective controls and an ambitious, energetic, resourceful people discover the benefits and profits to be seized by immediate and rapid exploitation. This process was dramatic in the white pine of Minnesota, as it has been elsewhere, but were the wastage and the necessarily long aftermath really necessary? Could it happen again today in some other country, given the same essential conditions?

These are questions that may well be pondered. The book would, in the third place, lead to the conclusion that unless forest conservation begins in the very early stages of regional forest exploitation, it cannot be very effective. By the time the regional consequences of uncontrolled exploitation become so evident in the region that conservation action is taken, it is too late to do more than salvage remnants from the general wreckage.

Above all, public action suited to the situation, can best go with rather than behind private forest exploitation.

Development of a Blister Rust Control Policy for the Nation's Forests in the Inland Empire. Donald N. Matthews and S. Blair Hutchison. Pp. 116. U. S. Forest Service, 1948. A preliminary report. Mimeographed.

For more than two decades public agencies have been waging a successful but costly fight against this imported disease which is thoroughly established in the Inland Empire region, which comprises roughly northern Idaho, western Montana, and eastern Washington. Today, greatly increased costs raise anew the question of justifiability, how far to go, how much to spend to protect western white pine, viewed from the broad standpoint of national interest.

Western white pine is the most important timber on 3.6 million acres, one-third of which is saw timber, about one-half young growth and the rest deforested. So far, blister rust control has been done or is planned on 2.6 million acres. Experience shows that blister rust can be controlled; that control is most economical if made part of a general program to increase white pine yields and thereby reduce the cost of control per thousand board feet. New hormone sprays offer hope that future control costs may be lowered. White pine has been the key species for the lumber industry, and in the future will remain important despite increased utilization of other wood.

Events will not wait for blister rust control to be completed. It must be pushed energetically, coupled with a management program. Proper timing and balance are essential, though there are real but surmountable difficulties involved in growing white pine.

The report reviews control history, lessons learned from it, responsibilities, decreased and fluctuating output, rising costs; analyzes consumption trends and future needs for white pine; discusses regional importance of the lumber industry and white pine's importance to it; brings together data on control costs and the degree to which white pine yields may be increased by good management.

It then recommends "1. That the Forest Service launch an aggressive campaign to grow continuous crops of white pine. From now on make it a white pine project instead of a blister rust control project. 2. That the white pine project should be developed on whatever scale appropriations permit with the work always concentrated in those units which will give the largest stable output of white pine for the money spent. 3. That a great deal of emphasis should be put into developing cheaper control methods, a stable program, and more effective blister rust control workers. 4. That there should be an aggressive program to bring good management to all those lands, regardless of ownership, which have been dedicated to growing white pine because of high productivity and relative economy of treatment. 5. That, however, the limitations of mixed ownership be realistically faced. And that provision be made to simplify the land ownership pattern where adequate management by every owner is not assured. 6. That the objective in this region should be to grow an amount of white pine in keeping with regional and national needs. 7. That in fulfillment of this objective there should be spent four million dollars annually during the next five years for blister rust control and white pine management on the national forests. After that, for 15 years the expenditure should be about 1.3 million dollars annually."

This study is significant because it treats blister rust control as part of the entire problem of improving white pine yields through better silviculture and other management measures, and not as a program apart. It sees clearly that some forms of land ownership cannot be permitted to continue to break up a unified management and control program. It

contemplates that fully stocked stands and proper methods of cutting will in themselves help solve the blister rust problem. Fractional stands may not justify the costs of control; full stands will. This type of economic-social-technical analysis helps to answer the question, "Does good forestry pay?" by showing some of the costs resulting from lack of forestry or from partial forestry.

A Vegetation-Types Map of Tanganyika Territory. Clement Gillman. Map in full color, scale 1:2,000,000 (size 24 x 24 inches), 31 photographs, text map of types of land occupation, 31 pp. text. American Geographical Society, New York, U.S.A. 1949. $1.00.

The map, published by the American Geographical Society, is the crowning achievement of the career of Clement Gillman, who died in October 1946 before its completion. He was the great authority on the geography of Tanganyika. The map, which was begun in 1913 on a scale of 1:2,000,000, is based on classification into 8 principal types of vegetation: (1) forest, (2) woodland, (3) bushland and thicket, (4) wooded grassland, (5) grassland, (6) permanent swamp vegetation, (7) desert and semi-desert, (8) vegetation actively induced by man; and two intermediary types, one between (1) and (2), and the other between (2) and (3)-(4). In addition, a distinction is made between two subtypes of grasslands — valley grasslands and mountain ridge and slope grasslands, and between two other subtypes of vegetation actively induced by man—vegetation induced by the indigenous population and vegetation induced by settlers.

Use is made of the term "complexes," to represent various types of vegetation found in conjunction with or in juxtaposition to one another. These are indicated by means of widely spaced circles or dots of the color representing the type of minor vegetation showing up against the ground color of the dominant type of vegetation.

Used in a larger sense is the concept of "catena." A "catena" is a distributional sequence of vegetation types determined by a given set of physiographical or hydrographical conditions (or both simultaneously) constantly repeated. Two "catenas" are particularly noteworthy in Tanganyika. The first is the vast peneplain of the central plateau which consists of alternating ridge and upper hillsides woodlands, of grasslands on the valley bottoms and of bushlands and wooded grasslands between the two on the lower portion of the hillsides. The second, in the much more sparsely vegetated Northeast, consists of alternating woodland and bushland, depending upon topographical conditions which cause variations in humidity, either due to the exposure or the altitude of the terrain.

From the forestry standpoint, the pitifully small extent of forest remnants in the large river basins is particularly striking. As is stated in the introduction to the map "the plains can remain, or again become the home of a stable rural population only if the forests are protected against the inroads of the mountain dwellers and if the rehabilitation of the forest areas is energetically and promptly carried out in the many areas where deterioration is advanced."

Influence of Woodland Chaparral on Water and Soil in Central California. P. B. Rowe, Pp. 70, illus. Published by the State of California under terms of a co-operative agreement with the California Forest and Range Experiment Station, U. S. Forest Service.

The San Joaquin Basin in Central California, located between the Sierra Nevada on the East and the Coast Range mountains on the West, covers an area of 20 million acres (8 million ha.). Of this, 2.5 million acres (1 million ha.) of cultivated land depend entirely upon irrigation in this semi-arid climate. In addition 3,170,000 acres (1,283,000 ha.) are potentially irrigable if water utilization facilities can be improved. However, floods, which occur at intervals exceeding one in five years, cause great damage.

The flanks of the coastal region and the lower portions of the Sierra Nevada are covered with brush vegetation, mainly consisting of *Ceanothus* spp., *Aesculus californica*, *Lonicera interrupta*, etc., commonly called chaparral, which exerts a marked influence upon the water table and erosion, but which is subject to more or less frequent fires.

In 1929, exhaustive experiments were started using six plots, 1/40 of an acre (0.01 ha.), each in order to determine what results clearing land by burning it over, and other such practices, have on runoff and erosion. Mr. Rowe's report explains in detail the results achieved by these experiments over a 9-year period.

It appears that the destruction of vegetation by fire increased water runoff on an average by 14 percent on experimental plots burned over annually, and by 2 percent on plots only burned twice during the 9 years. The average annual rate of erosion, in the first instance, was 25,000 lbs. per acre (28,000 kg. per ha.) and in the second, 1,000 lbs. per acre (1,100 kg. per ha.) whereas on the control plots it amounted to only 1.5 lbs. per acre (1.7 kg. per ha.). After 3 to 4 years, ravines formed, following surface erosion on plots burned over annually.

The chaparral cover causes a slight loss of water by direct evaporation, but this loss amounts to only 5.2 percent of the total rainfall. On the other hand, it results in the partial reduction of soil moisture fluctuation.

Measured over 4 years, from 1934 to 1938, the average annual water production (runoff water plus infiltration water) was greater in plots burned over annually than on control plots — 27.9 inches (70.9 cm.) compared to 26.2 inches (66.5 cm.). However, most of the water derived from the burned-over plots consists of runoff water loaded with silt and discharged swiftly during storms. Consequently it is lost for any useful purposes, unless it can be retained in reservoirs. These would be costly to construct and their capacity would be reduced rapidly due to deposits of eroded soil displaced from the mountain sides.

Such studies present a striking demonstration of the prime importance of the proper care of the vegetative cover in mountainous regions for the maintenance of water resources.

Minimum Rate Fire Insurance. H. T. Gisborne. Pp. 4. Research Note No. 72. Northern Rocky Mountain Forest and Range Experiment Station, U. S. Forest Service. April 1949.

In British Columbia, rebates on fire insurance premiums are granted to logging operations which use specified procedures for recognizing bad fire days and also which take specified steps to prevent and control fires on those days. It is believed that operators in other regions can profitably reduce their chances of loss by using the same method. The actions to avoid the dangers resulting from severe fire days during the normal fire season include:

(1) Identifying such days in advance. Four factors are taken into account: (a) calendar date, indicating general stage of dryness of vegetation; (b) daily low humidity, which controls moisture content of fire fuels; (c) fuel moisture content measured by standard ½" sticks, which represent condition of coarse fuels and take care of carry-over effects of recent precipitation; (d) wind velocity.

(2) Enforcing specified requirements to reduce number of logging fires. The great threat is fires in slash where logging fires commonly start.

(3) Pre-organizing of fire-fighting facilities and trained fire fighters with leadership, so that prompt and effective suppression action will be taken.

(4) Shutting down operations in cases of extreme danger.

These measures have reduced losses on timber, logs, and equipment. The instruments for spotting bad fire days are obtainable. Such an orderly program of fire control may be beneficial in other regions where logging fires are a severe source of loss, even though insurance is not available.

UNASYLVA is prepared by the Division of Forestry and Forest Products and published by the Information Division of FAO at the Organization's temporary headquarters in Washington, D. C. It is printed in Baltimore, Maryland, U.S.A. UNASYLVA is published in English, French, and Spanish. UNASYLVA may be obtained from the following sales agents: Australia: *H. A. Goddard Pty., Ltd., 255a George St., Sydney;* Canada: *The Ryerson Press, 299 Queen St. W., Toronto 2;* China: *The Commercial Press Ltd., 211 Honan Rd., Shanghai;* Czechoslovakia: (*Moravia* and *Bohemia*) Orbis, Stalinova 46, Prague xii; (*Slovakia*) "Journal," Leningradska 14, Bratislava; Denmark: *Ejnar Munksgaard, Norregade 6, Copenhagen;* East Pakistan: *Farcos' Publications, 2 Inglis Rd., P.B. 13, Ramna, Dacca;* Egypt: *Librairie de la Renaissance d'Egypte, 9 Sh. Adly Pacha, Cairo;* Finland: *Akateeminen Kirjakauppa, 2 Keskuskatu, Helsinki;* Hungary: *Grill's Bookshop, R. Gergely A.G., Dorottya Utca 2, Budapest V;* India: *The Oxford Book & Stationery Co., Scindia House, New Delhi; The Mall, Simla; 17 Park St., Calcutta; Messrs. Higginbothams, Mound Rd., P.B. 311, Madras;* Ireland: *The Controller, Stationery Office, Dublin;* Italy: *The European Regional Office of FAO, Villa Borghese, Rome;* Netherlands: *N. V. Martinus Nijhoff, Lange Voorhout 9, The Hague;* Norway: *Johan Grundt Tanum Forlag, Kr. Augustsgt, 7A, Oslo;* Union of South Africa: *Central News Agency Ltd., P.O.B. 1033, Johannesburg;* United Kingdom: *H. M. Stationery Office, P.O.B. 569, London, S.E.1;* United States of America: *International Documents Service, Columbia University Press, 2960 Broadway, New York 27, N. Y.; United Nations Bookshop, Lake Success, N. Y.; FAO Documents Sales Service, 1201 Connecticut Ave., Washington 6, D. C.* Requests from countries where sales agents have not yet been appointed may be sent to: FAO Documents Sales Service, Food and Agriculture Organization of the United Nations, Washington 6, D. C., U.S.A. Annual subscription US$3.50, single copy 65 cents, in local currencies.